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## WESTERN RESERVE UNIVERSITY

### Department of Surgery

# A STUDY OF INFECTIONS OF THE KNEE-JOINT, AND THEIR TREATMENT[1]

A PRELIMINARY REPORT

BY DUDLEY P. ALLEN, M. D.

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AND

DR. ELIOT ALDEN,

Assistant Surgeon, Lakeside Hospital Dispensary

THE title of the paper which I present to you indicates sufficiently its character. Even a full discussion of the various infections of the knee is more than can be compassed satisfactorily within the allotted time.

In explanation, however, it may be said that during the last two or three years in the service at Lakeside Hospital, an experience has been gathered which has greatly aroused our interest. As a result, we are at the present time following out certain lines of investigation, in the hope that it may be possible to clear up some of the obscure problems which have puzzled us hitherto.

There are numerous cases of inflammation of the knee-joint in which the chief manifestations are swelling with effusion, and pain and tenderness on pressure or motion. To these have usually been applied the name "articular rheumatism." They have usually been sent into the medical wards, and have been treated with salicylates. Some cases have been quickly benefited, while others have pursued a chronic course, and have finally been dismissed with marked limitation of motion, or perhaps with joints still swollen and tender.

Among the cases classed as rheumatism, we have found on investigation a varying ætiology, viz., syphilis, infections of gonococcus, pneumococcus, streptococcus, tuberculosis, floating cartilages, both tuberculous and traumatic, besides various cases of chronic synovitis, the cause of which we have been unable to determine. We have gathered within a few years something over eighty cases of diseased knee-joints, but it is not until recently that anything like an effective study of these cases has been instituted.

A statistical study of the cases will not be attempted at this time, but selected cases will be utilized for the purpose of illustration.

Before discussing the conditions which may be called autoinfectious, it may be of interest to speak of four cases of infection, treated by incision and gauze packing. Two cases were infections from wounds; one followed gonorrhœa and one exposure to cold.

The history of the cases is as follows:

[1] Read by invitation before the Academy of Medicine of Philadelphia, March 5, 1906.

CASE 1. Surgical No. 3248. Admitted Sept. 10, 1902. Discharged Nov. 27, 1902. Male, æt. 41 years, locomotive-engineer.

*Family History.* Negative.

*Previous History.* Children's diseases. Gonorrhœa seventeen years ago. Complete recovery.

*Present Illness.* Five weeks ago, struck left knee with a hatchet, which entered to the bone. Continued work for the remainder of the day. Laid off work for one week, when wound seemed to be healed. Worked second week, when wound opened and discharged a watery fluid. Called a physician. Since then (three weeks ago) knee has been getting worse. Much pus discharged from wound.

*Physical Examination.* Well developed and nourished man. Heart and lungs negative. Left knee much swollen, tender, especially on the inner side; increase in local temperature. Glands in groin enlarged. Urine normal. Incision above the patella 2 cm. long.

*Operation.* By Dr. Dudley P. Allen.

Probe, passed into sinus, led directly into joint. The joint cavity was laid open by horseshoe-shaped incision, with convexity upward from external to internal side, passing above the patella. The tendon of the quadriceps extensor divided, the patella reflected downward, and the joint freely exposed. The synovial membrane was roughened, and formed the walls of an abscess cavity. Cavity cleaned out and joint completely packed with iodoform-gauze. Leg dressed in a partially flexed position.

Sept. 16. Under an anæsthetic, packing was removed. Joint found fairly dry, with no pocketing of pus. Packing replaced. Leg dressed in a more extended position.

Sept. 20. Under anæsthetic, packing removed. Joint irrigated with saline. Two small drains of iodoform gauze inserted, one on each side. Leg dressed nearly straight, in position desired for final result.

Sept. 24. Under anæsthetic, drainage removed. Joint irrigated and drainage replaced.

Sept. 26. Knee redressed without an anæsthetic.

Oct. 20. Packing discontinued. Weight, which had been used to aid in extending the leg, removed.

Oct. 22. Operation by Dr. J. A. Sherbondy.

Under an anæsthetic, the granulating area above the knee, an area 10 x 6 cm. skin grafted by the Thiersch method.

Nov. 11. Entire surface covered with skin. Patient in wheel-chair.

Nov. 22. Patient on crutches. Leg swells during the day, but reduces at night.

Nov. 27. Resting considerable weight on leg, but still wears a Ham splint. General condition good. Discharged improved.

*Pathological Report.* Streptococci.

Re-examined March 1, 1906. Is working every day as fireman, shoveling many tons of coal. Knee is stiff. Otherwise well.

CASE 2. Surgical No. 5826. Admitted Dec. 12, 1904. Discharged April 15, 1905. Male, æt. 26 years, carpenter.

*Family History.* Negative.

*Previous History.* Has had pneumonia.

*Present Illness.* Six weeks ago, cut himself above the left knee with a chisel. Applied raw beef for four days following. Then the opening was enlarged, cleaned out, and packed. Four or five days later, multiple incisions were made around the knee-joint and packed. Condition improved until two weeks ago, when he complained of tenderness over tibia. Ten days ago the leg was opened and head of tibia was found necrosed. The wound was curetted and packed. Patient has had no rise in temperature the past week, but redness and pain on motion have increased.

*Physical Examination.* Moderately well developed and nourished man. Pale. Heart and lungs normal. Left leg is in a splint. Above knee are five or six incisions with packing. Joint greatly enlarged, and very tender and painful.

*Operation.* By Dr. Dudley P. Allen.

A horseshoe-shaped incision was made, passing below the patella and cutting the ligomentum patellæ. Flap containing patella dissected upwards. Patella dissected off. The leg was flexed and knee-joint thoroughly exposed. It was found filled with granulation tissue. All infected tissue dissected and curetted away. The lower end of the femur and upper end of the tibia were found necrotic in spots, the articular surfaces, however, being peculiarly exempt. These spots curetted away. Cavity irrigated with 1 to 5,000 bichloride and packed with iodoform gauze. Skin flap loosely fastened at its lower extremity with a silkworm-gut stitch. Knee dressed in a flexed position on a Ham splint.

Dec. 21. Under gas, packing removed and replaced.

Feb. 23. Patient up in wheel chair.

March 15. Sinuses syringed daily with peroxide, and packed with iodoform gauze saturated with tincture of myrrh.

March 23. Patient on crutches.

April 16. Sinuses very small. Very small amount of drainage gauze.

Re-examined March 1, 1906. Knee stiff. Can do all kinds of work, and walks without difficulty.

April 15. Discharged improved.

CASE 3. Surgical No. 3874. Admitted April 17, 1903. Discharged Sept. 1, 1903. Male, æt. 25 years, clerk.

*Family History.* Negative.

*Previous History.* Has had gonorrhœa.

*Present Illness.* Was admitted five weeks ago to medical service for typhoid fever. Knee commenced to swell, and has been very sensitive ever since. In constant pain. Fluid has been twice aspirated. Fluid shows gonococci.

April 18, 1903. Operated by Dr. Maurice H. Richardson.

An incision three inches long made into knee-joint on inner and outer sides. Fluid and flakes of fibrin escaped. Joint thoroughly flushed with 1 to 2,000 bichloride, followed by saline solution. Plain gauze drainage in both inner and outer wounds. Provisional silkworm-gut sutures inserted.

April 20. Gauze removed and provisional sutures tied.

May 1. Operation by Dr. Dudley P. Allen.

Horseshoe incision below patella and flap, including patella dissected upward. Joint disorganized and contains pus. Joint curetted and packed with iodoform gauze.

May 4. Under chloroform, dressing changed and knee straightened.

May 7. Dressed without anæsthetic. Considerable discharge of pus-colored green by bacillus pyocyaneus.

Aug. 15. Patient on crutches.

Sept. 1. Bearing some weight on knee; wound entirely healed; swelling and tenderness nearly gone. General condition good.

Discharged cured.

*Pathological Diagnosis.* Subacute gonorrhœal arthritis.

Re-examined March 1, 1906. Knee stiff; can use perfectly in every way.

CASE 4. Surgical No. 3587. Admitted Jan. 5, 1903. Discharged May 15, 1903. Male, æt. 18 years, laborer.

*Family History.* Negative.

*Previous History.* Measles, whooping-cough, and pneumonia.

*Present Illness.* Three weeks ago, worked for two days standing in water, and at that time had a rash on entire body, resembling urticaria. In two and a half weeks his legs from ankle to knee became red, swollen, painful, and hot. His physician told him he had erysipelas, and later, inflammatory rheumatism. This condition lasted two days. Later, the trouble settled in his right knee and left ankle. He has been gradually improving; the pain is not so great, the swelling less, the movements better.

*Physicial Examination.* Well developed and fairly well nourished. Heart has loud systolic murmur at apex, transmitted to axilla and back; slight enlargement. Lungs normal. Right knee swollen, tender; fluctuating and increased temperature. Left ankle slightly swollen and tender. Urine normal.

Jan. 6. Operation by Dr. Dudley P. Allen.

Under ether, an incision was made into the knee-joint, on the upper and inner aspect. A quantity of pus escaped. Pus could be expressed from the direction of the thigh. The incision was enlarged in a horseshoe-shape to the opposite side, cutting the ligamentum patellæ. Pockets of pus were found in the thigh; accordingly, longitudinal incisions were made anteriorly. Longitudinal incisions were also made posterior to the knee-joint. The cavities were packed with iodoform gauze. An incision was made above the left ankle. Considerable pus was evacuated. The bone was found denuded of periosteum. Wound packed with iodoform gauze.

Up to Jan. 24th, wounds packed daily. Considerable discharge. Dressing on alternate days begun.

Jan. 31. Part of packing left out.

Feb. 21. Packing nearly all out, but little discharge.

Feb. 28. All drainage dispensed with.

March 8. Pocket beneath lower end of femur opened spontaneously and pus evacuated. Drained.

May 15. Patient walking on crutches. Slight discharge from lower end of femur and upper end of tibia. No movement in knee.

Discharged improved.

*Pathological Report.* Streptococcus and staphylococcus pyogenes aureus.

Re-examined March 1, 1906. Knee stiff; can walk perfectly well.

Every one who remembers the preaseptic days knows with what dread such cases were formerly regarded. The advent of antiseptic treatment was inadequate to combat infection in so complicated a joint, and doubtless all of you recall cases in which the most radical drainage and washing of the knee-joint has failed to check infection, and the case has terminated either in amputation or death.

Guided by experiences of this sort, we have at last adopted another method. The knee has been opened by a transverse incision below the patella, and lateral incisions to give free access to the upper portion of the joint. The lateral ligaments have been left intact. The knee has been flexed, thoroughly washed, and while in the flexed position, every portion of the joint has been packed with iodoform gauze, care being taken to carry the gauze into the posterior part of the joint, about the crucial ligaments and behind the condyles of the femur. By the flexed position and packing, absolutely perfect drainage is obtained, and the septic absorption ceases. When it has ceased, the gauze is withdrawn, a less amount is reinserted, and as rapidly as possible the leg is straightened. Healing takes place by granulation. By a careful adjustment of the dressings and bandage, and the gradual straightening of the leg, the granulations are covered, and the patients have recovered with a straight leg. Of course the knee-joint is stiff.

Case 2 was of the most desperate character, since the disease was far advanced when the patient was admitted to the hospital. Extensive abscesses formed at various points of the leg. These were incised and drained as they developed, and the final result was most satisfactory.

The results have been such as to encourage us to repeat the treatment in similar cases as they present themselves. By this method, every part of the joint is drained with absolute

certainty, whereas by multiple incision with drainage and irrigation, it is extremely difficult to drain the posterior part of the joint. The result is certainly as good as can be obtained by resection of the joint, and the care of the case is less difficult and the relief of sepsis is more certain.

As opposed to this radical method of treatment is an experience of unusual interest.

The history of the case is as follows:

CASE 5. Surgical No. 6663. Admitted Sept. 18, 1905. Dismissed Jan. 23, 1906. Male, æt. 27 years, machinist.

*Family History.* Negative.

*Previous History* Grippe several years ago. Laid up two weeks.

*Present Illness.* Oct. 31, 1904. Fell from ladder, causing compound fracture of right leg four inches above ankle. In hospital in Indiana until Sept. 8, 1905.

Sept. 15, 1905, was admitted to Lakeside Hospital. About one week before admission, leg became inflamed, opened, and discharged pus.

*Physical Examination.* Patient in poor general condition. Heart and lungs negative. Urine cloudy; specific gravity 1012; acid; faint trace albumin; sugar absent; few leucucytes and epithelium; few granular and hyaline casts. Right leg showed a compound, ununited fracture about one inch above ankle. It was swollen, much inflamed, and there was a thin, yellow, purulent discharge.

Sept. 19. Left foot and ankle considerably swollen, and on examination the left knee-joint found to be much distended with fluid.

Sept. 21. Left knee was aspirated, and 3 ounces greenish yellow fluid was obtained. Joint was washed with 1 to 40 carbolic acid, and injected with 2 ounces iodoform emulsion containing 30 grains iodoform. Fluid produced pure culture of streptococcus.

Sept. 25. Swelling much diminished. The temparature on Sept. 21st was 103° F. Pulse 110. No essential change in temperature or pulse.

Sept. 26. Antistreptococcus serum 10 c.c. injected every four hours until Oct. 6th. Had marked rash following injection of serum.

Oct. 6. General condition improving.

Oct. 24. Right leg amputated. Healing per primam.

Oct. 29. Began baking left knee daily, carrying temperature to 330° to 350° F.

Jan. 23. Discharged. No pain. Knee almost normal. Walks well on crutches. Still a little grating in joint. Could flex knee almost to right angle.

The complications in this case were unusual. The patient was markedly septic, there was evidence of kidney involvement, as shown by the presence of albumin and casts in the urine. Amputation of the fractured and septic leg, leaving a knee-joint on the opposite side infected with streptococcus, would probably have proved fatal; a similar result would probably have attended an operation on both leg and knee at the same time, nor could much have been expected from any operation on the knee leaving an infected fracture.

The result following aspiration and injection of the knee-joint surpassed our highest anticipations, since the case appeared well-nigh hopeless by any method of treatment. After the condition of the knee had improved, the fractured and infected leg was successfully amputated. When the patient was dismissed from the hospital, he was walking upon crutches and the infected knee-joint could be flexed to right angle, and was free from pain and tenderness. In other cases of infection of the knee-joint, when the conditions are not urgent, and the patient's life does not seem to be endangered, we shall be tempted to repeat this treatment:

The question naturally arises, Will other pyogenic organisms be similarly affected by it? Our experience is too limited to warrant us in drawing any conclusions.

That autoinfections with pyogenic organisms may be extremely virulent is evidenced by the following case:

CASE 6. Surgical No. 561. Admitted Jan. 24, 1899. Died Feb. 6, 1899. Female, æt. 40 years, dressmaker.

*Family and Previous History.* Not obtainable.

*Present Illness.* Four days ago consulted physician for stomach and bowel trouble. The following day left knee began to pain. She was given salicylates and felt better. Next day she asked for crutches to get about.

*Physical Examination.* Fairly well developed and nourished. Heart normal. Left knee-joint greatly distended. Fluctuation distinct. Pain on manipulation. Local temperature raised. Skin slightly reddened. Flexion limited. Enlarged glands in left groin. Lungs: Right infraclavicular space slightly higher percussion note, increased respiratory murmur and vocal fremitus; no râles. Abdomen negative.

Jan. 25. Knee aspirated and pus withdrawn. Immediate operation. The knee was freely opened by incisions on each side of the patella, and posterior to the condyles. The joint was filled with cream-colored pus. The cavity was flushed with sterile water and drained with plain gauze. The two days following, the patient was delirious.

Jan. 27. Amputation of thigh through lower third. Wound drained with iodoform gauze.

Feb. 2. A few granular casts in urine.

Feb. 3. Two stitches were removed from stump and about 3 ounces seropurulent fluid escaped. Wound flushed daily with boracic acid solution. Wound unhealthy. White blood count, 27,000. Patient steadily grew worse, was very restless and delirious at times. Pulse and temperature rose steadily.

Died Feb. 6, 1900.

*Pathological Report.* Pneumococcus in pure culture.

*Autopsy.* Chronic fibroid apical tuberculosis. Œdema and congestion of the lungs. Cloudy swelling of the heart muscles. Fatty degeneration and cloudy swelling of liver and kidneys. Hemorrhagic infarct of spleen. Uterine myomata. Amputation wound middle third left thigh.

Cultures from stump, diplococcus lanceolatus, and staphlycoccus aureus.

What would have been the result had treatment been instituted earlier is, of course, problematical. It would seem quite possible that it would have been more effectual.

On further study it may be found that certain infections are amenable to treatment by aspiration and injection; that others may be treated by incision of the joint and packing with iodoform gauze, while in other cases, nothing will suffice but amputation.

One conclusion is inevitable; viz., that when doubt exists as to the nature of a joint inflammation, aspiration should be practised in order that the character of the infection may be established as quickly as possible. With early diagnosis it may be possible in certain classes of pyogenic infection to aspirate, wash, and inject joints, and thus to secure entire relief. In other cases, incision and packing may be necessary.

The subject of tubercular infection of the knee is most complex. Richard Volkmann published, over twenty years ago, in the *Klinische Vorträge*, an article on joint tuberculosis. With this were a number of beautifully colored plates to illustrate the position that joint tuberculosis is usually primary in the bones, and that the joint becomes involved only secondarily. Undoubtedly this is true in a large number of cases. Several times in my clinic, during the resection or erasion of a knee-joint, I have pointed out that no involvment of bone could be found after careful search, only to find, when about to close the operation, that the curette slipped into a bone cavity, probably the starting-point of the disease. Several times, by the enlargement of the inner condyle of the femur, with the consequent genu-valgum, I have diagnosticated tuberculosis of the condyle without joint involvement, and by means of an extra-articular incision have opened and evacuated a tubercular deposit.

Huntington of San Francisco has done the same thing for tuberculosis of the head of the femur by means of an opening through the trochanter major.

Doubtless the X-ray will aid us materially in the diagnosis of such cases. Personally, I have not met a case of the sort since I have had a thoroughly efficient Röntgen apparatus at my disposal.

Unquestionably, such cases are very rare. They are not, however, on this account to be overlooked. The common cases of tuberculosis, whether primary in bone or not, usually show synovial involvement early in their history. The uncertainty of diagnosis usually leads to the treatment of such joints by what is called the conservative method of rest, counter-irritation, plaster bandages, etc. To be sure, some cases may be relieved and others cured by such methods. In cases in which we have suspected tuberculosis, it has been our custom of late to aspirate the joint and fill it with an emulsion of iodoform. The results have been quite satisfactory. A great encouragement to this method of procedure has been the results obtained in psoas and iliac abscess treated by a similar method. We now have a considerable number of seemingly hopeless cases of psoas and iliac abscess treated by aspiration and injection of iodoform. In some cases we have *aspirated* and *injected* four or five times, while in other cases the operation has been repeated as many as ten times. The patients have recovered, and are alive and seemingly in perfect health after years. The efficiency of the method has led us to adopt it in other conditions, and the results in the knee-joint have proved very encouraging. Unfortunately, it is often difficult to establish positively the diagnosis of tuberculosis, since the cover-slip preparations obtained by aspiration do not show bacteria of any kind, and the inoculations of guinea-pigs have not induced tuberculous infection. Although we have injected with iodoform a considerable number of tuberculous

knee-joints, we have not been able, in the short time at our disposal in preparing this paper, to look up the cases with sufficient thoroughness to report the end results. The impression made upon us by our experience thus far is, that in cases of what we have diagnosticated as tuberculosis, injections at a fairly early stage, before the disease is far advanced, are decidedly beneficial.

Of late, encouraged by the impunity with which we have opened the knee-joint in many cases, we are beginning to question if it is not wiser to resort to early incision in cases suspected of being tuberculous.

In a recent case of effusion into the knee-joint, unattended with much pain or tenderness, a movable body could be felt. This was removed. On microscopic section this body was found to contain typical giant cells, and the condition was unquestionably tuberculous. The history of the case was as follows.

CASE 7. Surgical No. 5636. Admitted Jan. 5, 1905. Discharged Feb. 15, 1905. Female, æt. 20 years, negress, housewife.

*Family History.* Negative.

*Previous History.* Children's diseases. Typhoid fever five years ago.

*Present Illness.* Five years ago, one month after getting about after typhoid fever, she had pain and swelling in left knee. Swelling reduced at times by liniment, but would reappear. Two months later, left wrist became swollen and painful. For past five years, condition steadily grew worse. For past year, elbow has also given trouble.

*Physical Examination.* Well developed and nourished. Left knee is slightly swollen, circumference 15 inches; right knee 13½ inches. Swelling is general, but most noticeable on outer side, above and below the patella and at the inner condyle. Flexion painful beyond 75 degrees. Swelling soft, but no distinct fluctuation. Left wrist slightly swollen, especially on flexor surface. Circumference one half inch larger than right, movements through arc of about 30 degrees. Slight pain on pressure and manipulation. Left elbow slightly painful on internal condyle. No limitation of motion.

Jan. 13. Operation by Dr. Dudley P. Allen.

Incision on inner side of knee, over an apparently foreign body, and joint opened. One half-ounce amber fluid escaped. A piece of cartilage was found nearly free, but attached on the inner side of the knee, to the parietal wall of the joint cavity. It was excised, and measured 3 x 3 x 1 cm. Several small, white, tongue-like bodies were found free or loosely attached. The synovial membrane appeared inflamed. Cavity irrigated with 1 to 40 carbolic, filled with iodoform emulsion, and capsule sutured with catgut and skin with silkworm gut. Ham splint. Left wrist injected with iodoform emulsion under pressure.

Jan. 24. Knee still swollen.

*Operation.* By Dr. Dudley P. Allen.

Knee-joint aspirated, but very little fluid obtained. Injected with 2 ounces iodoform emulsion. Needle puncture closed with catgut stitch.

Feb. 15. Knee much better; can walk about on it with little pain or difficulty. Wrist still painful.

*Pathological Report.* Mass of tissue. Color, pale yellow to pink. Where the color is yellow, it feels like cartilage. The surface is smooth and shiny. Coverslip and culture from fluid show no bacteria.

*Microscopically.* Material is infiltrated by many round cells, which, in places, have undergone necrosis and formed tubercles, many of which contain giant cells.

Feb. 25, 1906. Mother says daughter's lameness is scarcely noticeable. Walks without pain. Occasionally, slight swelling with slight pain in damp weather. Greatly improved in every way. Wrist absolutely well.

This and similar experiences lead us to question if a more radical method of procedure is not a wise one.

In doubtful cases, why is it not wise to incise a joint, obtain material for cultures, microscopical section, and animal inoculation, and at the same time apply to the interior of the joint the treatment seemingly best suited to it, whatever condition is found to be present?

Thus far, in certain cases thought to be tuberculous, we have filled the joint with an emulsion of iodoform, seemingly to the great benefit of the patient. Since the adoption of this method the time has been too short to give final results, since, as you all know, tuberculous knee-joints, seemingly cured, may give trouble after many years. I may say, however, that the results, so far as rapid improvement and mobility are concerned, seem much superior to the older methods of counter-irritation, rest, etc. One thing is certain, and that is, that no ill effects have followed the method. If early diagnosis were the only advantage this would certainly be a decided gain.

The physical appearances of a joint are often inadequate to a positive diagnosis of tuberculosis until the disease has existed for a considerable time. Aspiration, too, even when tuberculosis is present, may fail to secure bacilli or fertile cultures. Diagnosis by means of animal inoculation is not always successful. Tuberculin as an aid to diagnosis has not proved itself to be satisfactory in our hands.

The uncertainty of these methods of diagnosis is apparent from certain cases in which cover-slip preparations showed no bacteria, and in which cultures were sterile, while microscopic sections gave positive evidence of tuberculosis.

Certainly, free incision of the knee-joint offers the best opportunity for diagnosis. It permits the most radical treatment at an early stage of the disease, and, as a consequence, the results to be obtained are more promising. Guided by our observations thus far, we shall certainly pursue this method of treatment further.

The use of the X-ray has been spoken of as an aid to diagnosis. As a routine method it seems desirable. Besides giving information concerning the condition of the articular surfaces, it may reveal the presence of floating cartilages. These floating cartilages may be not only of traumatic, but also of tubercular origin, and are often associated with a considerable amount of fluid in the joint.

Another class of cases of the greatest seriousness, often difficult of diagnosis, and of frequent occurrence, are the cases of gonorrhœal rheumatism. Many joints may be effected at the same time, but, without having gathered statistics, my impression would be, that the knee-joint is the one which most frequently gives grave trouble, and is the one permanently impaired oftener than any other. The diagnosis is usually acute articular rheumatism, and the treatment corresponds to the diagnosis. A careful investigation of the history of the case will usually throw light upon it. Fluid obtained by aspiration may give characteristic cover-slip preparations, as shown in case 9, but, unfortunately, this is not always true.

We give the histories of two cases.

CASE 8. Surgical No. 4999. Admitted May 20, 1904. Dismissed June 10, 1904. Male, æt. 29 years, machinist.

*Family History.* Negative.

*Previous History.* Tuberculous hip. Gonorrhœa two months ago. Still discharge.

*Present Illness.* Five days ago, sudden pain and tenderness and swelling in left knee. Pain and swelling increased rapidly.

*Physical Examination.* Poorly nourished. Body covered with scabies. Urethra shows glairy discharge. Left knee swollen, tender, fluctuating, some redness, great limitation of motion. Holds knee in flexed position. Right leg atrophied and six inches shorter than left leg. Scars about right hip. Heart and lungs normal.

May 21. Operation by Dr. Dudley P. Allen.

Aspirated; several ounces bloody, purulent fluid removed. Washed with carbolic 1 to 40; injected with iodoform and glycerine 1 ounce.

Intense pain. Gave morphia.

June 10. Fluid gone. Still some tenderness over head of tibia. Discharged improved.

*Pathological Report.* Cover-slip and culture negative.

Feb. 26, 1906. Doctor reports patient perfectly well.

CASE 9. Surgical No. 6522. Admitted Sept. 22, 1905. Dismissed Dec. 1, 1905. Male, æt. 18 years, laborer.

*Present Illness.* Admitted to medical ward ten days ago. For six days before entrance, right foot and ankle have been painful and swollen. Some pain for a week previous.

*Physical Examination.* Joints involved are right elbow, right knee, right and left ankle. Swelling, redness, pain, tenderness. Right knee contains considerable fluid, and is painful on motion. Aspirated in medical ward, and gonococci found in fluid.

Sept. 26. Operation by Dr. R. W. Elliott.

Right knee aspirated and 11 ounces greenish fluid, containing fibrin flakes, removed. Cavity washed with 1 to 40 carbolic-acid solution and injected with 2 ounces iodoform emulsion.

Nov. 27. About on crutches. No pain in joints. Right knee occasionally swells slightly, and is slightly rigid. Discharged improved.

We have been employing aspiration, and washing with carbolic-acid solution, followed by the injection of an emulsion of iodoform in glycerine, in an increasing number of cases. Seemingly, joints thus treated have improved more rapidly than others. It is true that with gonorrhœal infection of multiple joints, some recover without treatment. This observation would seem to throw doubt upon the necessity of any radical treatment. I think, however, every surgeon has seen numerous knee-joints stiff from infection. My own observation is that the knee is the joint most seriously affected, and consequently the one most demanding radical treatment, and it is our purpose to pursue this method of treatment further.

Having now considered joint infections the result of syphilis, tuberculosis, trauma, auto-infection, and gonorrhœa, there remains the class of cases known as acute articular rheu-

matism. We do not, in this paper, consider chronic rheumatic arthritis, gout, etc. The question arises, What is rheumatism? The similarity which it bears to certain joint infections suggests that it may also be an infection. Many cases yield to treatment by the salicylates. In not a few, the enlargement of the knee-joint remains for an indefinite period, and motion is much impaired. It is cases of this sort which are especially interesting for study. We record three cases in which we have widely incised the joint and treated it with 95-per-cent carbolic acid. In case 11, the joint was poured full of the acid; this was allowed to remain while the joint was flexed and extended several times, and the joint was then thoroughly washed with 95-per-cent alcohol. The applications were immediately repeated. It is interesting to notice that while this method was applied to one knee, the other knee was washed out with a solution of carbolic acid in water 1 to 20. The knee treated by injection suffered considerable pain. That treated by incision and the application of carbolic and alcohol suffered almost no pain.

The histories of the three cases are as follows.

Case 10 is too recent for a statement of result, except so far as the immediate condition is concerned.

Case 10. Female. Admitted to medical ward Jan. 29, 1906.

*Family History.* Negative as to tuberculosis, cancer, rheumatism, heart and kidney disease.

*Previous History.* Always well. Never had rheumatism, typhoid fever, or any other contagious disease. Habits good.

*Present Illness.* Three days before admission to hospital, patient, on arising in the morning, felt dizzy, and had slight pain in right knee, which became more severe before evening. This same evening, patient noticed that the left knee and the right shoulder had become slightly painful. The following day patient had sore throat. Pain in joints more severe. Some chilly sensations. Some perspiration. On admission, temperature 101.6°. Respiration 25. Pulse 125.

*Physical Examination.* Patient well nourished. Skin clear. Tongue coated Throat reddened, right tonsil enlarged with few white patches upon it. Chest large and well formed. Lungs negative. Both knees somewhat swollen; surface temperature increased. Motion painful.

Jan. 30. Both wrists are now swollen. Patient made toxic with sodium salicylate. Lead and opium stupes applied.

Feb. 5. Knees strapped with adhesive and put in pillow-slips, which soon had to be removed.

Feb 9. Considerable fluid in knees, as noticed by floating patella. Aspiration of right knee gave few cubic centimeters sterile fluid; left knee, none. Knees painted with iodine.

Transferred to surgical ward Feb. 19th. At this time the swelling in the wrists had disappeared.

Operation Feb. 19th. At first one ounce of bloody fluid was removed, and then, on pressure, a thick sanguinous fluid, containing many floccuclent masses, was obtained. The joint was then thoroughly irrigated with 5-per-cent carbolic acid. A suture of silkworm closed aspiration wound. Dressings and posterior Ham splint applied.

Left knee: Longitudinal incision, 10 cm. long, was made external to patella, and knee-joint was fully exposed. The articular surfaces of the joint appeared normal. The synovial membrane lining capsule of joint cavity was very markedly thickened, of a dark purplish color. Fringes much hypertrophied. Several ounces of dark thick sanguinous fluid escaped. The joint was thoroughly irrigated twice with 95-per-cent carbolic acid, followed each time with 95-per-cent alcohol and sterile water. Capsule of joint sutured with plain gut. Skin incision closed with silkworm gut. Dressings. Posterior Ham splint.

*Pathological Examination.* Granulation tissue showing subacute inflammation.

*Bacteriological Examination.* Fluid from right knee slightly bloody, with white flakes, and few fibrinous strings. Cover-slip preparations failed to show organisms.

Cultures in bouillon and on blood serum failed to show a growth after 72 hours in incubator at 37.5° C. temperature. Guinea-pig injected with 2 c.c. fluid intraperitoneally still living.

Fluid from the right knee taken when joint was opened, is of straw color, slightly opalescent, thin and watery in consistency. Cover-slips failed to show organisms, only a few round and polymorphonuclear and red-blood cells being found. Cultures in bouillon and on blood serum remained sterile after 72 hours in incubator at 37.5° C. A guinea-pig was inoculated intraperitoneally with about 2 c.c. of fluid. Death within 24 hours.

Autopsy showed a slightly congested peritoneal surface, with slight serous exudate. Liver and spleen slightly injected. No other findings. Cover-slips showed a few cocci in one or two round cells, but they were not numerous enough to demonstrate whether or not they stained by Gram's method.

Cultures in bouillon, glucose agar stab, and on blood serum failed to show the slightest growth in seventy-two hours. Cause of death probably toxæmia.

Pathological sections were made from exuberant tissue above joint over the femur, and from below joint over the tibia. These were fixed in both formalin and in alcohol, and all show practically the same condition. The lining of the joint cavity is covered with a thin layer of fibrinous exudate containing a few round cells. Beneath this is a zone 2 to 4 mm. thick,

composed of highly inflammatory tissue. There are many newly formed blood-vessels with thin walls and capillaries, and the tissues between these is of a loose reticular nature, and markedly infiltrated with small round cells with a fair proportion of plasma cells, a few eosinophiles, but not many polynuclear leucocytes. Beneath this zone the vessels are larger, and distended with blood. The deeper tissues are largely fat. A Gram stain of tissue failed to show organisms in or on tissue.

*Diagnosis.* Intense congestion. Subacute inflammation of synovial membrane.

May 10, 1906. Since reading the paper in Philadelphia, the progress of the case has been extremely tedious. On the left side, that in which the knee was incised, there was a thrombosis of the popliteal vein, with swelling of the leg below the knee. Both knees have been extremely tender, but now are free from pain, but the joints are stiff. Both knees were flexed one week ago, under anæsthetic, and massage is being employed. One week later there is a decided gain in motion of both knees.

CASE 11. Surgical No. 5367. Admitted Oct. 13, 1904. Dismissed Nov. 7, 1904. Male, æt. 40 years, livery-man.

*Family History.* Negative.

*Previous History.* Children's diseases. For years has had frequent micturition, passing large amounts of urine. Often feels weak and dizzy, and vision becomes darkened.

*Present Illness.* Two years ago, while working on street-car, noticed that his right knee would pain him, especially at the back. Has noticed this pain off and on ever since. One week ago, had pain in back and knee-joint. Has been working up to two days ago. Four days ago, first noticed swelling.

*Physical Examination.* Heart, lungs, and abdomen normal. Right knee red and discolored from iodine. It is moderately swollen, circumference 8 cm. greater than left. Slight atrophy of the calf. Patella floats.

Nov. 4. Operation by Dr. Dudley P. Allen.

Joint aspirated. A small amount of fluid obtained, irrigated with 1 to 40 carbolic acid, and injected with iodoform emulsion 1 ounce to 30 grains. Splint.

Nov. 7. Knee better, but can walk but little without assistance. Discharged.

*Pathological Report.* Cultures sterile.

Left hospital Nov. 7th.

Nov. 12. Knee has been getting worse. Has been on feet considerably. Effusion in the joint, and pain.

Nov. 13. Operation, aspiration. Washed with 1 to 20 carbolic, and injected with iodoform emulsion. Splint.

Nov. 27. Splint removed.

Dec. 16. Fluid still present. Operation, aspiration. Washed with 1 to 20 carbolic, and injected with iodoform emulsion 1 ounce. Splint.

Jan. 10. No fluid. Slight pain on complete flexion. Discharged, improved.

Re-entered hospital Jan. 30th. Pain, limitation of flexion, and floating patella.

Operation by Dr. Dudley P. Allen.

Aspiration, 2 ounce clear fluid removed, irrigated with 1 to 20 carbolic, injected with 1 ounce iodoform emulsion.

Feb. 15. No effusion. Flexion limited and painful.

March 22. Re-entered hospital. Knee swollen; local temperature increased. Fluid and crepitus.

March 31. Aspiration by Dr. R. W. Elliott. No fluid obtained. Injection with iodoform emulsion 3 ounces.

April 15. Discharged improved. Walks with crutch.

May 14. Re-entered hospital with pain and swelling of right knee. Given sodium salicylate and potassium iodide, and knee baked.

June 3. Operation by Dr. Dudley P. Allen.

Incision 12 cm. on inner side of knee. On opening the capsule, some bloody fluid escaped. The under surface of the patella and end of femur were very rough and soft; the synovial membrane could be peeled off. Joint swabbed with 95-per-cent carbolic, followed by washing with alcohol and saline solution. Capsule sutured with catgut, and skin with silkworm gut. Splint.

June 10. Stitches out. Incision healed.

June 16. Swelling subsided. Knee the same size as left.

July 16. Does not complain of knee. Foot is slightly swollen.

July 25. Knee only slightly painful. Walks with crutches. Discharged improved.

Re-examined Feb. 23, 1906. No pain in knee. No fluid. Walks with cane. Troubled only in walking upstairs. Can flex knee to right angle without pain.

CASE 12. Surgical No. 6533. Admitted Sept. 28, 1905. Dismissed Dec. 6, 1905. Male, æt. 42 years, longshoreman.

*Family History.* Negative.

*Previous History.* Typhoid fever 28 years ago. No venereal disease. Alcohol to excess.

*Present Illness.* Four days ago, sudden pain in knee-joint, which caused him to fall. No known injury, but patient was intoxicated at the time. Has stayed in bed since.

*Physical Examination.* Patient well developed and nourished. Heart and lungs normal. Abdomen normal. Right knee larger than left. Slight local temperature and floating patella. Slight general tenderness, but no special point of tenderness. Muscles on the back of knee somewhat rigid. Little pain, except on complete flexion.

Oct. 20. Has been treated by rest and pressure, but fluid persists. No general symptoms.

*Operation.* By Dr. Dudley P. Allen.

Incision into joint on the inner side of the patella. In the synovial membrane is a transverse abrasion one inch long, with ragged edges. The synovial membrane was markedly inflamed. The joint cavity was swabbed with 95-per-cent carbolic acid, and followed by alcohol and flushed with saline. The incision was closed with silkworm-gut sutures. Splint.

Oct. 25. Feeling comfortable. Has had no pain.

Nov. 2. First dressing. Wound healed per primam. Stitches removed.

Nov. 27. Patient on crutches. Some motion in knee.

Dec. 6. Knee slightly stiff, but patient walks without crutches. Dismissed.

Feb. 26, 1906. Re-examined. Patient can now walk everywhere without pain. Knee is normal in size and appearance. Patient can flex leg about 35°. It is evident that this could be very greatly improved by proper treatment.

Whether further observation of cases such as those last described will result in a positive diagnosis of the cause of inflammation is uncertain. One thing is beyond question, and that is, that, in the cases we have observed, especially case 10, the thickening and congestion of the synovial membrane have been extreme, so great, in fact, that recovery without grave impairment of motion has seemed impossible. The results in cases 11 and 12 are certainly most encouraging, and are such as warrant a further trial of the method.

As we bring the immature suggestions of this paper to a close, we must beg your indulgence. The time at our disposal has been too short to permit the following of many of the cases. Thus the end results can be given in but a limited number. What has been presented is in the line of suggestion. A much longer time and many more observations will be required to establish any positive conclusions.

One conclusion, and only one, seems to us to be established, and that is, that the knee-joint, when infected or inflamed, is not to be considered as a closed cavity to be left alone. Our experience shows that it may be aspirated, injected, or incised with saftey, no accident having followed any of these procedures.

The advantages of the radical method are, certainty of diagnosis at an early period, and positive treatment at a time when it may prove efficacious.

Consideration of the Bier method of treatment has purposely been omitted in this paper, since, although the method is now being tried at Lakeside Hospital, our experience with it is too recent and too limited to permit of a discussion of the merits of the method, in comparison with those here suggested.

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## WESTERN RESERVE UNIVERSITY

### Department of Obstetrics

# MORTALITY FROM PUERPERAL INFECTION

By HUNTER H. POWELL, M.D.

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FOR the past twenty-five years it has been my privilege to have under my charge "St. Ann's Maternity and Orphan Asylum." The senior students of the medical department of Western Reserve University have here received most of their obstetric clinical instruction. Since this institution was established primarily for the benefit of unfortunate girls, our records show that ninety-one per cent of our cases have been primiparæ. Students have been allowed, under the supervision of my assistants, to make all necessary examinations, vaginal included, and to render assistance in all operations. But few of these students ever came direct from the dissecting-room, as all dissecting is done in the first and second years. Rigid antiseptic technique is enforced, differing herein in no respect from that required in all modern lying-in hospitals. I desire positively to enforce the statement that while all information possible is taught by abdominal palpation, I permit more vaginal examinations to be made for the purpose of instructing than need be made by experienced obstetricians in private practice. With these preliminary statements fully ap-

preciated, it must be conceded that, as a staff, we may well be proud of records that show we have not had a death from sepsis in the last one thousand deliveries. It is a pleasure to think that there are other lying-in hospitals, both in this country and in Europe, that can make reports equally as favorable. As a matter of fact, if we take the civilized world, it will be found that the mortality in lying-in hospitals from puerperal infection will range as low as 0.5. In many of the best-managed hospitals it has been practically eliminated entirely.

What a revelation we have when we compare these results with the reports from all the lying-in hospitals of Europe and this country prior to the year 1870, when Lister gave to the world his results of the application of Pasteur's discoveries. Lying-in hospitals had come to be regarded as charnel-houses. In despair and in the blindness of ignorance, many prominent medical men advocated the abandonment of hospitals. Duncan, writing on the subject of puerperal fever and its causes, stated: "It is as little preventable as any crime on the statute-books. It is possibly preventable, but it certainly never has been prevented. It is perhaps preventable, but it occurs in spite of every combination of circumstances that is known or supposed to prevent it." Meigs attributed it to the providence of God, which he believed in, rather than to the causes assigned, none of which he believed in.

Such was the consensus of opinion of the ablest medical men of the day, in spite of the wise words of Holmes, in this country, proclaimed in 1843, and of the practical experiments with chlorine waters by Semelweiss in Vienna in 1847. Obstetricians may take pride in the fact that it was the comparatively unknown accoucheur, Semelweiss, in the great lying-in hospital of Vienna, who antedated Lister in the application of antiseptics, reducing greatly the mortality from puerperal infection in his wards. Having in mind the contrast afforded in the results in hospital practice prior to and since the achievements of Pasteur and Lister, we ask ourselves, Have the same splendid results been obtained in private practice?

In a recent article on this subject, Webster says: "It is the general impression that there has been a marked diminution in the mortality of puerperal infection since the introduction of antiseptics. This is true only as regards hospital practice." Dr. Cullingworth, in his inaugural address before the Obstetrical Society of London, has stated that a careful investigation had convinced him that the mortality from puerperal infection in England and Wales was undiminished in private practice. Williams, writing in 1903, says Boxall and Byers claim that in England puerperal infection causes as many deaths as it did forty years ago in private practice. It is asserted by competent authorities that 12 per cent of all women dying in our large cities, between the ages of 20 and 50, die from puerperal infection. I am quite sure it is the belief of all who have given attention to this subject, that the mortality from puerperal infection has been diminished little if any in private practice. From the writings of many authorities of fifty years ago and more, it can be shown that the mortality in private practice from puerperal sepsis was often stated to be 1 in 100 or 1 in 120.

Is it any less to-day? Unfortunately, we have no statistics on this subject of any value whatsoever. Hospital statistics are, as a rule, accurate, and we therefore have positive knowledge of what has been accomplished towards banishing sepsis from the wards. No confidence can be placed in the accuracy of the reports of the registrars of any country on the subject of the mortality from puerperal infection in private practice. It would not be difficult to give the chief reason for this, but this is unnecessary. Many proofs of the inaccuracy of these statistics have been given by physicians in this country and in Europe, who, in the interest of humanity and of science, have made careful investigations. We have every reason to believe that the mortality from puerperal infection in all the large cities of Europe and America, outside of hospitals. is little less, if any, than 1 in 100 deliveries. I believe this estimate will be considered conservative by a large majority of the physicians who are giving attention to obstetric work. I believe it may be taken as a fair estimate that 75 per cent of all women who die in labor or during the puerperal period die of puerperal infection in some of its manifold forms. It

has been estimated by others at 60 per cent. Granting that these statements are correct, what a grave responsibility confronts the medical profession, in conjunction with municipal and other authorities. Let it not be forgotten that we are in full possession of all the knowledge sufficient to render the dread destroyer of our women practically obsolete. Shall we supinely continue to allow this state of affairs to exist? Shall we continue to allow confiding women to place themselves in the hands of ignorant midwives or poorly trained and careless doctors? Shall these women continue to find death at the hands of those to whom they come for help? These are indeed serious questions for the consideration of the profession. While it is our duty to continue persistent researches for the unknown causes of many diseases, it is surely a far more urgent duty that we should rescue from death or helpless invalidism the most valuable women of the world, those who, in obedience to divine commission and blessed yearning for maternity, endure the tortures of labor. Anæsthetics have greatly lessened the sufferings of labor; we have complete knowledge of the cause of "puerperal infection," the dread destroyer of the puerperium.

Along what lines shall our endeavors be made to afford to our parturient women the benefits of the great achievements of Pasteur and Lister?

But a few suggestions can be offered in so brief a paper. The subject is of so vast importance, and the difficulties to be overcome so many, it should be made the study of many men of the profession, especially of those who are in position to show by experience or observation the need of immediate reform in obstetric practice, in order to place it in harmony with the achievements being made in scientific medicine. In this reform, as in all other reforms, education and publicity are of first consideration. It is quite possible that a large proportion of physicians are not aware of the fact that deaths from puerperal infection have but little diminished in private practice for fifty years past. This is chiefly due to two facts; namely, the faulty statistics regarding such deaths, and to the too frequent habit with many physicians of seeing typhoid fever, malaria, or some other disease where puerperal infection alone exists. Physicians rarely discuss in public or in private their deaths from this disease. Preference is given to the discussion of all other cases. Help might come from occasional "experience meetings," devoted to our deaths from puerperal infection. Every one present should be allowed the floor. Such meetings might be equally as helpful as those devoted, for instance, to papers on operations for appendicitis, citing five hundred or a thousand consecutive cases without a death. Medical students in all our colleges should have the great importance of *aseptic technique* fully impressed upon them by the professor of obstetrics, as fully as by the professor of surgery. Practical application of this teaching should be enforced in the lying-in room. They should be made to understand that operative skill and diagnostic expertness count for naught unless supplemented by aseptic perfection. The larger the number of such trained men that our colleges can graduate, the sooner will their influence be felt by the untrained practitioner and by the public. While it is true that many deaths from puerperal infection are caused by careless or ignorant physicians, there is no question but that a great many more are caused by midwives. At least fifty per cent of women in labor are attended by midwives. This is especially true in all of our large cities. Midwives are no better than they were fifty years ago; their attendance is fully as deadly. Those who pretend to know most and act accordingly, by their greater frequency of touch and interference cause more deaths than the more timid of their number, who are content to trust more implicitly to nature. The "itinerant syringe" is still in evidence, working overtime. Either no efforts whatever are made towards asepsis, or efforts too absurd to be considered. It is marvelous that so little has been accomplished towards putting these women out of business. In some states they are supposed to register, but, as a matter of fact, practically nothing has been accomplished towards protecting women in confinement from these bearers of every known and unknown pathogenic organism.

The health-officers of all of our large cities are fully aware of the truths contained in these

statements, but profess to be powerless to effect reform, and perhaps they are. Publicity should be given to the fact that in every one thousand deliveries in private practice we deliberately allow at least ten women to die of a preventable disease, of the cause of which we have full knowledge. Efforts should be made to arouse the energies and consciences of careless and lazy physicians, and make them see that it is their duty to protect their cases during confinement with approximately the same safeguards observed in lying-in hospitals. Until midwives are better trained and safer, their work should be under the supervision of the health-officer and his appointees.

The glory of modern medicine is the prevention of disease, and surely in no direction can it be more wisely directed than in the saving of women from death or lifelong invalidism from puerperal infection.

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## WESTERN RESERVE UNIVERSITY

### Department of Surgery

# SUBCUTANEOUS INJURIES OF NERVES

### With a Report of Six Cases

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IT has long been known that the functions of a nerve trunk may in certain cases be restored, if its cut ends be brought together either immediately after an injury or after an interval of time has elapsed. Thus the problem presented by simple division of a nerve by an open incision is a simple one. On the other hand, in traumatic paralysis from subcutaneous injuries, such as follow fractures and crushing injuries, and in cases first seen after an interval of time has elapsed since the original injury, a number of perplexing questions are at once presented, to the solution of which the modern text-book offers very little accurate information.

The questions which immediately confront one in the treatment of such cases are: What is the exact nature of the injury? Has the nerve been torn, completely severed, or are the symptoms due to the effects of contusion? How long a time should elapse after traumatic paralysis of a nerve before operation for its relief should be urged, and what guides, if any, have we to aid us in deciding this question? How long a time after injury may we promise any result from operative relief, and how much hope of improvement may we hold out in such cases?

It is hoped that a consideration of the following six cases of musculospiral injury, together with some of theother cases already reported in the literature, will aid somewhat in answering the above questions.

Case 1. Mrs. W. L. R., aged 32, housewife, sustained a badly comminuted fracture at the junction of the middle and lower thirds of the right humerus. At the time of my first examination there was marked swelling of the whole arm, showing evident extensive laceration of the soft parts. A few days after the fracture was set, complete wrist-drop, with inability to extend the wrist or fingers, was noted, together with loss of sensation over the back and radial side of the forearm, corresponding to the skin area, supplied by the musculospiral nerve. Three weeks after the injury, the first evidence of returning sensation was recorded, and from then on the improvement was steady until perfect recovery of sensation at the end of three months. The last skin area to recover was that over the back of the thumb and first metacarpal. Twelve weeks had elapsed before there was any evidence of returning motor control, and fully a year before there was complete restoration of function. Four months after the injury, the patient had about one half the normal power of extension of the wrist, with still inability to extend the proximal phalanges.

During this time, of course, the improvement had been very slow, and hard to perceive from day to day, and the anxiety of the patient was aroused as to how much further improvement

could be expected, and at the end of what period we could say definitely that the restoration of function had reached its limit. To decide this question, a neurologist and a surgeon, both of international reputation, were called in as consultants. After a careful examination, they advised operation, on the ground that so long a time had elapsed since the injury, that no further recovery could probably be expected without operation, while an open incision might disclose that part of the nerve had been cut, or that it was being pressed upon by the bony callus, and surgical relief of such a condition might complete the recovery.

The final decision of the matter was left to me, and I took the responsibility of advising a continuance of expectant treatment, for the following reasons.

In the first place, there had been a steady improvement from week to week, from the time the motor function first began to return. To be sure, this had seemed very slow, but I could not make up my mind that it had come to a standstill. Furthermore, I had just read Bowlby's report of a similar injury, in which, there being no motor improvement up to three months after the injury, operation was performed, and a perfectly normal-looking nerve found. One month later, the motor power began to return, and was perfect fourteen months after the injury. I was able to find one other similar case in the literature, and these reports influenced me to delay any operative procedure for some weeks longer. As has already been stated, the outcome of the case completely justified this decision, for at the end of a year function was completely restored.

CASE 2. E. R., Austrian, aged 30, sustained a transverse fracture of the right humerus at the junction of the middle and lower thirds, from a crushing injury. There was immediate motor paralysis of the muscles supplied by the musculospiral nerve, giving the typical wrist-drop, and complete loss of sensation over the skin of the forearm supplied by this nerve. One week after the injury, beginning return of sensation was noted in the forearm, and sensory improvement was continuous from that time on, being practically normal at the end of eight weeks. Five weeks from the date of the fracture, union of the humerus was firm and all apparatus was discontinued.

Although there was still absolute motor paralysis, the fact that sensory impairment had practically recovered gave me confidence that I had to deal simply with a contused nerve, and that a few weeks would show a beginning return of motor power. This expectation was justified by the appearance of the first evidence of motor power, ten weeks after the accident. The return of muscular power was not complete until fully ten months after the injury, but after five months the patient was able to do hard, muscular labor, apparently as well as ever. As in the preceding case, so in this one, the last motion to return was that of lifting the fingers when held in the piano-playing position; i. e., complete extension of the proximal phalanges.

CASE 3. John R., aged 24, farmer, consulted me for pain and numbness of the left forearm with partial wrist-drop, which he stated was gradually increasing. I learned that, three months before, he had sustained a fracture of his left humerus, which had united firmly at the end of six weeks. Shortly after the splints were removed, he began to have pain shooting down the back and radial side of the forearm into the thumb and back of the hand. This was followed by gradually increasing loss of the power to extend his wrist and fingers, and beginning wrist-drop. Massage, passive motion, and faradism were ordered by his physician, and he was told that a few weeks would suffice to rid him of these symptoms.

Examination showed considerable atrophy of the muscles of the left arm and forearm. A moderate sized callus was easily felt about two centimeters below the middle of the humerus, which was somewhat tender on pressure over the inner side of the arm. Over the radial side and back of the forearm, response to sensory stimulation was slow, and the patient complained of a feeling of numbness over this area. The wrist was held in a position of half-flexion with the fingers partly flexed. By great apparent effort the patient was able to straighten the fingers, but not to extend them at the metacarpophalangeal joints, nor could the wrist be extended more than five degrees. It was quite apparent that the musculospiral was involved in the callus of the humerus, and was being pinched as the new bone became denser. Operation was advised, and accepted by the patient. The musculospiral was exposed below the bony callus, and being followed upward, was found to be completely surrounded by new bone. This was chiseled away and the nerve released. At the site of its bony imprisonment, an annular depression was found in the nerve, about one half-centimeter wide, narrowing the nerve to about two thirds its normal size. The nerve was pulled away from the bone, and held by a catgut stitch in the substance of the adjoining muscles.

Complete relief from pain followed immediately after the operation, and ten days later

the sensory function was apparently perfect. No gain in motor power was noticed until five weeks after the operative procedure, but from that time on motor improvement was steady until complete recovery six months later.

CASE 4. Louis E., aged 31, millwright, caught his left arm in a hydraulic press, the upper edge of the press passing across the arm just below the middle, and the lower edge across the forearm about ten centimeters below the elbow. There was no abrasion of the skin, but very marked laceration of the muscles and subcutaneous tissues. The arm was put at rest, and moist alcohol and boric-acid dressings applied. Five days after the injury, the swelling and œdema were very marked, extending from the shoulder down to the wrist. At this time it was noted that there was marked wrist-drop, with inability to extend the wrist and fingers, and there was a slow response to sensory stimulation over the area supplied by the musculospiral. The power to flex the wrist and fingers was also noticeably weak. These symptoms were regarded at the time as probably due to extensive laceration of the muscles, with possibly some contusion of the nerves, especially the musculospiral. On the eighth day there was distinct redness, tenderness, and in duration along the course of the brachial vein, a still greater increase of the swelling of the part, and a temperature of 103.5° F. About two centimeters above and below the internal condyle of the humerus, small incisions were made down through the deep fascia, giving vent to about three ounces of thick chocolate-colored fluid, with bits of muscle tissue in it. A culture taken at the time showed staphylococcus aureus in pure culture. Following these incisions, the swelling of the arm rapidly subsided, but the induration and tenderness along the brachial vein were not entirely gone until five weeks after the accident. Three weeks after the injury it was noted that there was complete wrist-drop, entire loss of the extension of the wrist and fingers, and lack of sensation over the area of the forearm and hand supplied by the musculospiral nerve. At the end of six weeks, the incisions having perfectly healed, and all evidence of the brachial phlebitis having disappeared, an incision was made over the musculospiral, and the nerve isolated and found to be almost completely severed at the level of the upper limit of the pressure exerted by the hydraulic press. A very fine filament about the size of heavy silk, possibly made up entirely of nerve-sheath, held the divided ends together, there being a gap of fully one sixteenth of an inch between the remaining portion of the two ends. The ends of the nerve were trimmed, united with fine silk sutures, and the skin wound closed.

Two days after the operation the patient declared that there was some sensation to touch over the previously anæsthetic area, and this response to stimulation of the skin varied from day to day, now more, now less, up to about the eighteenth day, from which time onward there was constant improvement. The first return of motor power was noted about twelve weeks after operation, and had practically returned to normal about fourteen months later.

CASE 5. Anton S., aged 19, laborer. Six weeks before consulting me, he had received a punctured wound from a hot wire through the fleshy part of the inside of his right arm. The wound had suppurated, requiring dressings for four weeks after the accident. Examination showed a small scar about six centimeters above the inner condyle on the inner surface of the left arm. There was slight wrist-drop, inability to extend the wrist more than five degrees, partial loss of the power to extend the fingers, and diminution of sensation over the radial and posterior surface of the forearm, although this could not be accurately determined, owing to the fact that the patient spoke nothing but Polish. At the end of eight weeks, treatment by massage, passive motion, and electricity, there was no improvement, either in the sensation or motor power, and operation was accordingly decided on. Exposure of the nerve showed a narrowing at the point of injury to a quarter its normal size. The narrowed portion was excised, the cut ends sutured with fine silk, and the wound closed.

Sensation was apparently as good the next day after the operation as before, but here, again, no accurate information could be gleaned, on account of the patient's inability to understand English. Six months after the accident, the patient was at work with a useful hand, and at the end of a year, function was practically completely restored.

CASE 6. Frank Y., aged 29, rod-roller, first consulted me sixteen months after a compound comminuted fracture of the humerus about its middle. Examination showed complete wrist-drop, with inability to extend the wrist or fingers, either actively or passively; marked atrophy of the muscles of the forearm, especially the extensor group; prominent spaces between the metacarpals; and a glistening, shiny skin, with absence of sensation over the area of musculospiral supply. Operation was advised, and agreed to by the patient. The nerve was isolated at the level of the old fracture, and found to be involved in a mass of cicatricial tissue, above which was a bulbous enlargement of the nerve, while the distal portion was found to be much attenuated. The cicatricial tissue was removed, together with a portion of the bulbous enlargement of the nerve, and the cut ends united in the usual manner.

Sensation began to return at the end of six weeks, and motion at the end of four and a

half months. At the end of a year the patient had the power to extend the wrist about forty degrees, and nearly complete power of extension of the fingers, but was unable to lift the fingers in the piano-playing position. At this time, he moved away from the city and was lost sight of, but as the improvement had been steady up to the time of the last observation, there is good reason to hope that time brought a nearly perfect restoration of function.

Do the above clinical records help in any way towards solving the questions propounded at the beginning of this report? In the first place as to the question of diagnosis between contusion and partial and complete severance of the nerve, the symptoms may be identical in both cases, and some writers argue that if, from the nature of the injury, there is doubt at to whether the symptoms are due to simple contusion, operation should be urged immediately, for the following reasons.

The operation, in itself, is usually simple, and if a normal-looking nerve is found, and the operation thus proves to have been unnecessary, no harm has been done. On the other hand, if a severed or crushed nerve is found, the time gained by immediate operation is invaluable, for the longer one delays operation after a nerve injury, the more likely is one to find degenerative changes in the muscles and joints, which seriously interfere with obtaining a good end result. However, patients are not in the habit of welcoming any operative procedure with any degree of joy, and if an operation proves to have been unnecessary, it is certainly distinct evidence of the limitations of our powers of diagnosis, and to some extent a discredit to our profession.

How long shall we wait, then, after traumatic paralysis of the nerve before urging operative interference, and what guides have we in making our decision? This is a question of much importance, and has received many different answers. Henricksen would operate a month after the injury if there has been no improvement, and some others advise even earlier operation; Bowlby would wait three or four months; Sachs, more than three and a half months; and some observers, even twelve to eighteen months. In the writer's first case, three months elapsed before any evidence of motor return was recorded. In Bowlby's case (1), in which operation was done at the end of three months, and a normal-looking nerve found, it was still another month before any motor improvement set in. Hammond (2) mentions a case of a boy with a facial palsy following a mastoid operation, in whom motion in the affected muscle was first noticed fifteen months later. The advocates of early operative interference maintain that if an injury is found that necessitates suture of the nerve, not only has much time been saved by not waiting, but the final results are more likely to be perfect. This, in the main, is true, and with male patients having injuries in which the operation scar would not be conspicuous, it would be legitimate, perhaps, to urge operation on these grounds, but in the first case recorded by the writer, the patient happened to be a beautiful woman, who was in the habit of appearing in the conventional modern evening dress with short sleeves. Would she not have had just cause for resentment if an unnecessary operation had been performed, leaving her with a conspicuous scar as a reminder of the limitation of the surgeon's knowledge.

A very noticeable feature of all these cases is, that sensation always returns weeks before motor power, and I believe that the condition of the sensory recovery gives us valuable assistance in making up our minds when to operate. If in these cases sensation begins to improve in two or three weeks, and goes on to practically complete recovery in one to two months, we should feel justified in waiting four months or more for beginning return of motion, and a year or more for complete recovery. But if the sensory return is poor or is absent, it is evident that we cannot expect much, if any, motor recovery, and in such cases a delay of six or eight weeks before urging operation should be sufficient.

The sensory condition of the part affected then should be watched with extreme care, as it is a great help in telling us what we may expect of motor recovery.

We have yet to consider the questions: How long a time after injury may we promise any results from operative relief? and, How much hope of improvement may we hold out in such cases? Furthermore, how long a time must the patient wait after operation before improve-

ment will begin? and how long a time will elapse before the maximum improvement will be reached?

In cases of primary suture, most surgical observers are agreed that restoration of function does not occur, as a rule, until two months after the primary suture. We may, in general, expect practically a perfect recovery following primary suture in from two months to a year, but it is never best to promise an absolutely perfect functional result.

A large number of cases of secondary suture of nerve has been recorded in which recovery occurred. Sensation always returns weeks before motor power, and motor power months, or even a year, before electrical reaction.

In the writer's cases, sixteen months was the longest time after injury before operation was done, in which case a good functional result was obtained, but the patient passed out of observation before hope of further improvement could be abandoned. The time of beginning sensory return varied from two days to six weeks, and from eight weeks to three months for its complete recovery. The motor recovery began in from eight weeks to six months, and was complete in from six months to over a year. So long ago as 1871, Jessop (3) reported a case where, after the lapse of nine years after the division of the ulnar nerve above the wrist, there was still anæsthesia and paralysis. Secondary suture was performed, with the result that sensation returned after three days, motor power after ten weeks, and restitution after nine months. In Robson's case (4) of ulnar paralysis of two and a half years' duration, sensation is reported to have returned on the third day, motor power n three months, and complete recovery in one year; and in Ogston's case (5) of affection of the same nerve of like duration, sensation began to return in a week. In one of MacCormack's cases (6), after six years' total ulnar paralysis, some return of sensation was reported on the day after the operation. In another of his cases — that of ulnar paralysis of six weeks' duration, the result of a bullet wound — the lacerated part of the nerve was excised and the ends joined by suture; sensation began to return thirteen hours after operation; motor result not reported. Ballance and Stewart (7) report a case of paralysis of the external popliteal nerve following a bullet wound, which showed distinct return of sensation when examined one and a half hours after operation. In Kennedy's four cases (8), sensation commenced to appear on the third or fourth day after operation, and motion in from three weeks to six months, the nerve having been previously paralyzed for a period varying between three and eighteen months. Henricksen (9) reports a very interesting series of nine cases of secondary suture, at periods varying from a month to two and a third years after the injury, with a practically perfect functional result in every case, although motor function in one instance was over two years in reaching a nearly perfect recovery. Numerous other cases of successful secondary nerve suture have been reported in the literature of recent years, most of them successful. A number of cases of failure of motor return have been reported, but the majority of these have been related too soon, in my opinion, to despair of further improvement. With the exception of Jessop's case (3) of nine years' duration, with perfect result, I have been unable to find any case of satisfactory motor return following secondary suture after an interval of two and a third years. Bowlby failed once at twelve years, once at six, and again at four years, to gain any motion worth while by secondary suture, but succeeded invariably under two and a half years.

With primary suture, then, we may be practically sure of a good result. But if the injury is of some standing, we may say that up to one month a practically perfect result may be expected, although not promised the patient; up to two and a half years we may expect a good functional result; beyond that period little can be promised beyond a return of sensation; but in view of an occasional success I believe that we should be justified in urging operation.

We may expect a return of sensation in a time varying from a few hours to several weeks. We may expect little or no motion under three months, and no perfect result much under a year, while we must not despair of improvement under two years.

A very important phase of this subject concerns the treatment of the paralyzed part

during the stage before and after operation. Too great emphasis cannot be laid upon the necessity of keeping the nutrition of the affected skin and muscles in the best possible condition by the use of massage, passive motion, and the galvanic current. Patients are prone to consider these measures as unnecessary and a bore, as improvement is so slow to appear and progresses at such a snail's pace, but the systematic use of such treatment makes all the difference between a good and a poor end result.

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## WESTERN RESERVE UNIVERSITY

### Department of Gynecology

# SUBCLAVIAN THROMBOPHLEBITIS FOLLOWING ABDOMINAL SECTION

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THROMBOPHLEBITIS is a complication occasionally found after abdominal operations, and in most instances occurs in the left femoral vein. The involvement of the left subclavian is very unusual, and in a hasty and imperfect review of the literature no similar instance was found.

The condition may occur as a primary affection in persons apparently in perfect health, and without any infection or dyscrasia of a gouty or other nature. Briggs, in the Johns Hopkins Hospital *Bulletin*, June, 1905, has collected a number of such cases. In one of these the subclavian vein was involved, and no infection, traumatism, or other assignable cause could be discovered.

As a complication it is frequently seen in infectious diseases, such as typhoid, pneumonia, influenza, pulmonary tuberculosis, syphilis, scarlatina, typhus, and gonorrhœa, also in gout, chlorosis, and acute articular rheumatism. In surgical cases it is apt to follow traumatism or varicosities of the veins, or infections in the area drained by the vein, or even infections in other areas.

After abdominal operations it occasionally occurs, and the left femoral vein is the one most frequently affected; if the left pelvic structures are subject to traumatism at the time of operation, the involvement of the left femoral can be readily understood, but it is more often affected than the right after operations upon the appendix or gall-bladder upon the right side of the abdomen. In fact, in phlebitis from any cause, this vein is the one most often involved.

The complication usually develops from one to three weeks after operation, and often occurs in so-called clean cases in which no pus has been found and during an ideal afebrile convalescence. Nevertheless, the consensus of opinion seems to be that the process is, as a rule, an infectious one, even if the presence of organisms cannot be proven. Welch, in *Allbut's System of Medicine*, vol. vi, gives a very thorough description of the pathology. The condition, whether from medical or surgical causes, presents the same characteristics. In the acute infectious diseases, such as typhoid, the specific germs are at

times found in the thrombus or vessel-wall. More frequently the common pyogenic organisms occur, but careful examination of some cases has failed to show organisms either on culture or microscopic examination. In the usual pyogenic infections, the organisms are generally the same as in the original lesion.

Besides infection, various causes have been suggested, such as some interference with the force or volume of the circulation, changes in the composition of the blood, whereby its coagulability is increased, or the nutrition of the vessel-wall impaired, or the presence of toxines which might act in the same way.

The symptoms are pain and induration along the vein, œdema in the part supplied, and cyanosis of the skin. The superficial veins distal to the lesion are dilated with dark venous blood, and the affected vein can be felt as a firm, very tender cord. The progress is usually very slow, and the thrombosis may extend above or below the original lesion. If recovery occurs, the termination of the process may be by softening and disappearance of the thrombus, with complete restoration of the original channel, or the clot may organize, forming a firm fibrous cord and a collateral circulation be formed.

The treatment consists in absolute rest, to avoid the possibility of dislodging an embolus from the clot. This accident has frequently caused the death of the patient. Elevation of the part to favor the return circulation, and application of heat and gentle elastic compression are also useful. If local applications are employed, they should be very gently applied, without friction. Morphia or other sedatives may be required for pain. Later on, when danger of embolism seems past, gentle massage and passive motion may be begun to lessen the stiffness and to improve the nutrition of the part. Tonics are advisable, and, of course, the primary cause must be treated.

Most of the recent contributions to the literature deal with femoral phlebitis following abdominal operations. The whole subject has been fully discussed by Goodrich in the Brooklyn *Medical Journal*, June, 1905.

Vander Veer, in *American Medicine*, July 13, 1901, reports four cases of femoral phlebitis after the following "clean" operations: One appendix, one angioma of the liver, one uterine fibroid, and one bilateral ovarian tumor. In all these the left femoral was affected; in no case was there severe loss of blood or any infection apparent; primary healing occurred in each case, and the bowels were not constipated.

Meyer, in *Annals of Surgery*, 1901, quotes two cases following appendix operations, and reviews the literature. He believes the infection may originate in an old latent focus, as in interval appendix operations or from the alimentary tract.

Lennender, in *Centralblatt für Chirurgie*, May, 1899, noticed femoral phlebitis five times after appendicectomy, three times upon the left. He thinks mechanical obstruction has something to do with it, and therefore advises raising the foot of the bed throughout the convalescence. He ascribes the obstruction to the pressure of the abdominal binder upon the femoral vein, pressure of an overdistended rectum upon the left iliac vein, or it may be due to feeble circulation from weakness or anæmia.

Coe, in *Medical News*, July, 1, 1899, reports six cases of post-operative phlebitis — three of the pelvic veins and three of the femoral — with recovery in all cases. He thinks it is really a septic process, although hard to prove.

Strauch, in *Centralblatt für Gynaekologie*, 1895, noted three cases of phlebitis in nineteen cœliotomies after he began the use of ether, and thinks that this may account for it, possibly by increasing the amount of carbon dioxide in the blood.

J. G. Clarke, University of Pennsylvania *Medical Bulletin*, vol. xv, No. 5, explains the left femoral thrombosis as beginning in the deep epigastric and passing backward through the external iliac. This would hardly explain an involvement of the left femoral if the incision were well to the right of the median line, as so often occurs.

The following case of subclavian thrombophlebitis occurred recently in my practice.

On December 9, 1905, I was called in consultation by Dr. G. Bowman to see a case of ruptured ectopic gestation. Both the history and symptoms were very typical, and need not be detailed. Her condition was very grave, and she was at once removed to Lakeside

Hospital. It was decided to watch her very carefully to see if her condition would not improve somewhat before operation was attempted. Under stimulation with strychnia, submammary saline infusion, and saline enemata, with a small amount of morphia for the pain, her condition improved very markedly, although the vomiting was rather persistent. Two days after admission, an abdominal section was performed, a ruptured gestation-sac of the right tube was found, and a well-formed fœtus of about three months was lying free in the clots filling the pelvis. The left tube showed a chronic salpingitis with an occluded fimbriated extremity. The right tube and ovary, the left tube, and the vermiform appendix were removed, the clots washed out as thoroughly as possible, and the abdominal wound closed in layers without drainage.

She rallied well from the operation, and two days later had an attack of pain in the region of the gall-bladder, with transient icterus. Both rapidly subsided. Eight days after the operation, she complained of pain in the left axilla and shoulder, and in the supraclavicular fossa, with local induration and tenderness along the course of the axillary vein. The œdema and tenderness extended throughout the arm, and also involved the left side of the neck to the median line in the area drained by the subclavian vein. There were no cerebral symptoms, and there was no interference with respiration.

The pain was very severe at times, and occasionally required morphia. The arm was elevated, lightly bandaged with abundant cotton batting, and heat applied continuously.

Throughout the convalescence, localized areas of induration, more marked than that of the surrounding tissues, and exquisitely painful, would develop and gradually subside. One of these occurred on the anterior surface of the forearm, and another in the supraclavicular fossa.

The progress was very slow, but the condition gradually improved, and, after several weeks, gentle massage of the forearm, with passive motion, were instituted. At the present time, about six months after the operation, the arm is almost perfectly recovered, although it tires rather easily.

In searching for an explanation of the complication in this case, there are several possibilities. The Trendelenburg position was used, and the shoulder supports, although they were carefully padded, may have inflicted some traumatism, but there was no evidence of any injury due to them; they have been used for years in the operating-rooms at Lakeside, and never before have led to any trouble. The possibility of infection from the saline infusions must also be considered. Some of these were in the left submammary region, but there was no sign of any irritation around the punctures, and this area was but slightly involved by the subsequent œdema. The arms were not raised above the head, as is sometimes done with a patient in this position, so that no undue tension was exercised upon the vessels. The icterus and pain in the gall-bladder were very transient, and apparently independent of the trouble. The grave anæmia following the loss of so much blood and the hydræmic condition of the blood, which no doubt existed from the administration of the numerous infusions, might easily explain the phlebitis, as such a complication frequently occurs in certain forms of anæmia. There was no evidence of any pelvic or wound infection following the operation, and as far as the pelvic condition was concerned, the convalescence was all that could be desired. The temperature rose to 102.5° immediately after the operation, but gradually subsided. This could easily be explained by the absorption of the adherent clot in the pelvis, which could not be completely removed at the time of operation.

WESTERN RESERVE UNIVERSITY
Department of Surgery

# FRACTURE OF THE CARPAL SCAPHOID

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AN injury to the wrist-joint which has deservedly received more or less attention since the advent of the X-ray is the fracture of the carpal scaphoid. In hospitals, or where the physician has access to a machine, the diagnosis might seem easy, according to the positive or negative findings.

The history of most cases reveals the fact that the patient has either incorrectly diagnosed his own injury or has been under treatment for a sprained wrist. After a period of forced rest because of the severe pain and tenderness on motion, an attempt is made to resume work. In a very short time, however, the recurring pain and loss of strength in the affected wrist compels the patient to give up. A second immobilization, with possibly hot baths and massage, again brings improvement, but on attempting to work with the hand, he is gradually forced not only greatly to favor it, but, because of the pain and suffering, again to stop work entirely. Rest again brings improvement, but on resuming work the pain and disability do not improve beyond a certain point.

On inspection, the wrist presents on the radial side a swelling and thickening. Because of this the outlines of the anatomical snuff-box are less distinct in outline. The bony landmarks are not changed, unless accompanied by some other injury.

The styloids are in their normal relation. The local tenderness is found directly over the scaphoid bone itself, and can best be felt in the anatomical snuff-box by pressing hard with the thumb against the broken scaphoid. This procedure will usually cause pain to such an extent that it cannot be borne by the patient. Care must be exercised not to mistake the pain caused by pressure against the radial nerve for that of fracture. Where the scaphoid is normal, this pain can be borne without much trouble.

Passive motion in trying to force extension beyond its voluntary limit produces a most characteristic muscle spasm, such as is obtained in the early stages of a tubercular joint. Crepitus is seldom obtained, because of the immobility of the fragments and the collection of blood within the joint capsule. This will even prevent extravasation visible under the skin. Because of the position and peculiar shape of the scaphoid, lying as it does with its long axis at an oblique angle with relation to the other bones of the hand and arm, it is extremely apt to give a deceptive appearance in the X-ray. The diagnosis from the X-ray should be made with the utmost caution, and only considered positive when the view of the bone obtained is at right angles to the long axis.

A sprain of the wrist ordinarily becomes entirely well after a period of three to four weeks, with treatment of fixation, hot baths, and massage. Cases, however, with a permanency of symptoms beyond this time, presenting extensor spasm and local tenderness, should lead to suspicion of fracture of the scaphoid. Another injury which might lead to error of diagnosis is a fissure in the lower end of the radius; with this injury, however, the location of the point of tenderness would be rather over the fissure than the fractured scaphoid.

Colles's fracture will at times present a deformity which might become misleading. The common sheath of the extensor carpi radialis brevior and longior and extensor secundi internodii pollicis has for its base the periosteal covering over the lower end of the radius. If this sheath be opened by a bone fissure, it would result in a sudden fluctuating mass of triangular shape over the radial half of the wrist. However, close inspection of the

deformity and the presence of the impaction would lead to the correct diagnosis. Both these lesions — that is, Colles's fracture, with its engorged bursa and fracture of the scaphoid — have been found present in the same patient, and in these, the non-return of perfect function would be due rather to the scaphoid injury than Colles's fracture.

Cases coming under observation long after the original injury might be confused with the many cases of arthritis.

In all cases where an early positive diagnosis has been possible, and where the X-ray shows little or no displacement, the expectant treatment should be employed for a reasonable length of time.

In cases, however, which, in the earlier stages, have either not been recognized or have not yielded to the customary treatment of fixation — hot baths and massage — operation should be advised.

The advisability of operation after a lapse of six months to one year should be submitted to the patient, with no definite promise, yet a possibility of relief, and only undertaken in cases of very marked disability.

The operation for relief is to remove the proximal half of the scaphoid or the entire bone, according to the position and remaining mechanical irritation of the distal half.

An incision three-fourths of an inch long on the dorsal aspect of wrist parallel to the tendon of the extensor carpi radialis will give free access to the proximal half of the bone. If trouble is experienced in bringing it into view, a slight abduction of the wrist will help greatly to bring it into the field of operation. After finding the line of fracture, the proximal half can be fixed by a hook, and after cutting the ligamentous attachments with a tenotome, it can be readily removed.

Excision of the proximal half is attended with little risk under aseptic precautions, and promises permanent relief.

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## WESTERN RESERVE UNIVERSITY

### Department of Gynecology

## URETERAL SYMPTOMS IN GYNECOLOGICAL CASES

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BACKACHE, pains in the pelvis and groins radiating downward along the inner and anterior aspects of the thighs, the pains aggravated by walking, dysmenorrhœa, and intermenstrual dysmenorrhœic-like pains, are the classic subjective symptoms of disease of the generative organs in the female.

Pain produced by even light pressure in either of the lateral fornices of the vagina, with or without bimanual manipulation, is usually ascribed to a hypersensitive or tender ovary.

An important clinical sign of a sclerocystic ovary has been the occurrence of an intermenstrual pain, which the patient describes in a like manner as that which she suffers at a regular menstrual flow. The explanation of the occurrence of the pain at this time is that the eruption of the Graafian follicle has been delayed by a thickened and resisting tunica albuginea.

Several years ago I became skeptical concerning the truth of the above preamble.

The numerous incidents of ovarian fibromata, and particularly ovarian cystomata developing to large proportions before giving rise to discomfort or pain; the observance of cases with old infections of ovaries and tubes living for months without pain, even at menstrual periods; the fact that patients are operated upon because of pain in one or the other

ovarian regions when the macroscopic appearance of the ovary upon the *opposite* side seemed to warrant its removal, rather than the supposedly affected gland (or possibly both); and again, the recurrence of the same symptoms for an indefinite period (ingeniously described as "habit" pain) following the removal of these sclerocystic ovaries,— are strong evidence against the usual assumption that pain in the pelvis necessarily means degenerative or even inflammatory changes in the ovaries or tubes.

In seventy-five per cent of all multiparous women whom I see who complain of these same classic subjective symptoms of disease of the generative organs (with or without symptoms referable to the urinary bladder), and in at least ninety per cent of nulliparous women (married or single), the pain and the tenderness during manipulation is located neither in the uterus, tubes, nor ovaries, but in the *pelvic portion of the ureters*.

Injuries during child-birth; pressure by inflammations and tumors of nearby organs; extension of inflammations, either from the kidney or the bladder (though this latter is now in debate, especially in regard to tuberculous processes); injuries due to the passage of renal calculi; the almost universal hyperacidity and extreme concentration of the urine in the female; and (most important) a type of woman in which there is a peculiar susceptibility to inflammations of mucous membranes throughout the entire body, — are the chief exciting causes of changes in the ureters.

The recurring congestion with each menstrual period is a most important factor in prolonging the catarrhal process, and, incidentally, speaks against the curative power of passive hyperæmias. The production of an artificial menopause, with the cessation of periodic congestions, explains the relief of pain following the removal of the ovaries *after* the catarrhal process has been allayed.

A case recently came to autopsy in which a sarcoma had developed in the *left* sacroiliac synchondrosis, had passed to the right side along the posterior pelvic wall, avoiding the left ureter, but so completely surrounding the right ureter as to occlude almost entirely its lumen for two inches below the pelvic brim, the ureter above being dilated to a very large caliber.

The spasmodic attacks of pain in the side opposite the origin of the malignant growth were readily explained by the condition of the ureter found at autopsy.

I saw recently a case in which a fibroid of the uterus had been correctly diagnosed. The patient was suffering acute paroxysms of pain, possibly not unlike labor pains. It was thought that the fibroid was a submucous one, and that the uterus was attempting its expulsion.

An examination revealed a *subperitoneal* fibroid, underneath which was an enlarged, thickened, and extremely sensitive ureter.

The temporary use of a pessary relieved the symptoms.

These two cases, and others, in which gross pathologic lesions exist in nearby structures, are not of so great importance, clinically, to the surgeon. If a ureteritis is recognized in an operative case, one naturally would not expect a speedy relief of all symptoms following the operative procedure.

But the last group of cases, in which there are no demonstrable pathologic changes in the uterus or its adnexa, yet in which the patient complains of the various ailments with which all of us are so familiar, and in whom we find, upon examination of the pelvis, *sensitive* and *painful areas*, I wish most particularly to discuss.

They are of the type of women in whom the internist would naturally suspect some predisposition to tubercular infections. In the thin-chested, long-waisted, and angular form, in which one expects to find a prolapsed kidney and liver, and possibly a general enteroptosis; in just such a case as one might be tempted to remove the vermiform appendix through the incision made for a fixation of a movable kidney on the supposition that the prolapsed organ had interfered with the blood current of the appendix; and in cases subject to catarrhal affections of the air-passages,— do we find this simple catarrhal process in the ureters? It is but *one local phase* of a *general* condition.

I know of no condition within the female pelvis so easy of demonstration as a ureteritis.

A diseased ureter is readily palpated, whereas to feel the normal ureter requires the fineness of touch taught only in the schools of the Fagins.

So frequent is the condition, that I have found it extremely advantageous to examine as a routine practice the anterior vault and lateral fornices of the vagina *before* attempting a deeper palpation or a bimanual examination.

I believe that a sclerosis of the ovary should not be classified as a pathologic but rather as an involutionary change; and, as such, it should not necessarily give rise to pain, or should not be especially sensitive.

To repeat: it has been my experience in from seventy-five to ninety per cent of all cases complaining of the classic subjective symptoms of disease of the uterus and its adnexa to find the tenderness located in the ureters.

The treatment of those especially prone to catarrhal processes must be general rather than local. The ordinary hygienic, dietetic, and hydrotherapic measures are quitees sential.

To these I have added the following:

(*a*) The support of the abdominal viscera with a correct, straight-front corset, giving to the form its natural shape, namely, a somewhat flattened lower abdomen, as seen when a patient assumes a most erect posture.

(*b*) The daily administration of a small quantity of salts (preferably Carlsbad), or some mild aperient water.

(*c*) Creosote in two-minim doses three or four times a day.

(*d*) Absolute rest during menstrual period.

Douches and tampons are contraindicated.

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## WESTERN RESERVE UNIVERSITY

### Department of Obstetrics

## THE PROPHYLACTIC TREATMENT OF PUERPERAL ECLAMPSIA[1]

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THE high mortality of puerperal eclampsia is sufficient warrant for further consideration of this frequently discussed subject.

To be most successful in the treatment of any disease, we must know its cause. Today it is very generally believed that toxæmia is the cause of puerperal eclampsia. Why one patient has toxæmia of pregnancy and another does not, cannot be answered as yet, and it is not the purpose of this paper to discuss that question; but the fact that we are still ignorant of the cause emphasizes the importance of a most intelligent and thorough application of such means as are within our reach. It is because I believe that such management will greatly decrease the number of cases of eclampsia, that I wish to urge a systematic treatment which has given me the most satisfaction.

Whether toxæmia is due to excessive production or insufficient elimination of toxine, from whatever cause, the treatment is much the same. It sometimes happens that the symptoms of toxæmia are not apparent, but this only serves to emphasize the need of a closer study of each case of pregnancy, and it will rarely fail to show some sign which should put us on our guard.

As the first step in the prophylactic treatment of eclampsia we should seek so to manage our cases as to prevent toxæmia. To this end, women should be educated to engage their physician early in pregnancy, and when first seen, they should be carefully instructed regarding diet, bathing, rest, and the action

[1] Read before the Clinical and Pathological Section of the Cleveland Academy of Medicine, June 1, 1906

of the kidneys and bowels. Such advice must not be given in a mere perfunctory manner, but insisted upon as absolutely essential. Most women have a tendency to constipation during pregnancy, and they must see to it that no day passes without a thorough action of the bowels. There is frequently a larger amount of urine passed in twenty-four hours than in the non-pregnant state, but this should not give us a feeling of security. The patient should be instructed to measure the twenty-four-hour amount occasionally, as well as to furnish frequent specimens for examination. She should drink large quantities of water. These means will not prevent all cases of toxæmia, but that they will prevent some is evident from the promptness with which cases that have not been properly managed, respond as soon as such treatment is adopted.

When the patient is first seen, she should be instructed to notify us at once in case of persistent headache, difficult vision, return of nausea, diarrhœa, marked decrease in the amount of urine passed, and œdema of the extremities, especially of the hands and face. Rare indeed is the case of eclampsia that has not presented some one of these symptoms early enough to give opportunity for effective treatment. The urine should be examined at once for albumin, if not already done, but whether found or not, treatment for toxæmia should be started at once. It may be found, to a slight degree, in a large number of cases when the above symptoms are not present, and have no significance, but it must not be ignored till we can be assured that it is not increasing and is not due to toxæmia. Casts may or may not be present. If we find they are increasing, even though other symptoms are not, the danger is becoming greater. A decrease in the amount of urea excreted does not indicate impending eclampsia, as shown in a previous paper.[1]

How can a patient presenting some or all of the above symptoms be treated so as to offer the greatest hope of preventing an attack of eclampsia? If the albumin is more than a mere trace, and especially if attended with other symptoms, or if the other symptoms are present without albumin, there should be no temporizing. The patient should be immediately put on a milk diet, a saline given, and the patient instructed to drink large quantities of water. Daily examinations of the urine, together with the appearance or disappearance of other symptoms, quickly show how effective such treatment is. In some cases the albumin entirely disappears and may not return, and in most cases there will be a marked improvement in all respects. In such cases the diet is gradually increased to include some of the more easily digested starchy foods, but no meat or eggs are allowed till after labor. During the balance of the pregnancy a careful watch is kept for a return of threatening symptoms. Such a rigid diet may seem extreme to the patients and their friends when symptoms are not marked, but if convulsions sometimes occur when there have been no apparent symptoms, it cannot be wise to temporize, simply because they are not urgent. In those cases where we have no warning, we are of course helpless to prevent convulsions, but, fortunately, in closely observed cases this will seldom occur. In instances where the symptoms return or become more severe, or were severe from the beginning, there must be added to the treatment already mentioned, rest in bed most of the time, warm baths each day, and at times hot packs. When we see that the symptoms are becoming worse in spite of this treatment, labor should be induced without delay. Some such cases may have convulsions if labor is brought on, but if they do, there is greater hope of saving them than if we had waited till the convulsion came, as it certainly would. It is not wise to postpone such an operation till it is the last resort to save a patient, and while we might err occasionally in a case where it would not have been necessary, such a mistake would be attended with little or no more danger to mother or child. If we have succeeded in carrying the patient to the beginning of labor without convulsion, much has been gained, but the pain of labor is often the exciting cause of convulsions, so that as soon as labor begins, treatment should be started to reduce such a cause to a minimum. Patients in whom such symptoms have occurred are given a prescription for chloral, with instruc-

[1] Cleveland Medical Journal. vol. iii, pp. 151–158.

tions to begin taking it at the onset of labor, and it is continued during labor as the conditions seem to indicate.

In all these cases the urine should be examined at the beginning, during, and at the close of labor. I wish also to urge the examination of urine in all cases of premature labor. Toxæmia frequently is a cause of the early commencement of labor, and early examinations in such cases would put us on our guard early enough to be effective in many cases. The examination of urine during labor will frequently show us a danger that would otherwise be easily overlooked. If such examinations show increasing symptoms of convulsions, labor should be terminated, and such measures adopted as if convulsions had already occurred. These remedies are the giving of a saline cathartic, the subcutaneous injection of normal saline solution, and the use of hot packs. The use of chloral should also be continued till danger is past. If there is a strong pulse, it would be advisable to allow enough hemorrhage following the delivery of the placenta to reduce the tension, especially if a saline solution is to be given. Further discussion of this subject will take us into the treatment of eclampsia, and that is not the purpose of this paper. It is not claimed that the treatment as outlined above will prevent the occurrence of eclampsia in all cases of toxæmia, any more than the prophylactic treatment of any disease prevents all attacks of it, but such treatment will very materially decrease the number of cases of eclampsia, and that is a great gain. In reporting the following cases I cannot say that convulsions would have occurred in all of them if the treatment used had not been adopted, but that does not argue against the treatment. The cases have been chosen to show the different degrees of toxæmia, rather than to take them in the order as they have come in my practice.

Case 1. A primipara, 21 years of age, was referred to me by her physician in a neighboring town. She gave no history of previous illness, except an attack of rheumatism when a child. Pregnancy was normal up to the end of the seventh month, when a slight trace of albumin was occasionally found. During this time there were no other symptoms. About the end of the eighth month, symptoms of toxæmia suddenly developed. These was headache, nausea, black spots before the eyes, and œdema of the face. The urine showed one third per cent of albumin and a few granular and hyaline casts. The patient was put to bed and given large quantities of water to drink. Each day she was given a hot bath, and wrapped in a blanket so that profuse sweating followed. A saline cathartic was given every day or two. Diet was restricted to milk. At the end of forty-eight hours the albumin had decreased to one eighth per cent, casts diminished in number, and other symptoms began to improve. As milk caused nausea, gruel was given about the fifth day. She was also allowed to sit up part of the day. From this time up to her confinement, which occurred at about eight and one half months, the general symptoms were much improved, and the albumin was about one tenth per cent. During this period of treatment the amount of urine varied from 1700 c.c., showing excretion of 27 gms. of urea when her symptoms were the worst and she seemed to be on the verge of convulsions, to 1500 c.c. with an excretion of 12½ gms. of urea the day of delivery. During the labor, which was normal, chloral was given, and also following delivery. She made an uninterrupted recovery, and when she went home the urine showed only a slight trace of albumin.

Case 2. A primipara, age 32, referred to me by Dr. H. Up to the middle of the seventh month there had been no albumin, but at this time examination showed one eighth per cent, with a few hyaline casts. There were no other symptoms of toxæmia. Following a rigid diet, the albumin diminished, and there was never more than a trace found, and only an occasional cast. The diet was gradually increased as described, but no meat or eggs were given. Labor occurred at the end of the ninth month, and was normal. There were no convulsions. This case perhaps would never have been in danger, but that could not be known when albumin was first found.

Case 3. A primipara, age 29. No albumin was found till the end of the eighth month, when the specimen examined showed one eighth per cent. There were only a few casts. The customary treatment was adopted. During the following month the albumin varied from one eighth to one third per cent. The casts did not vary much in number. With the persistence in the amount of albumin in spite of the treatment, the question of producing labor was considered, but put off from day to day because there was no increase in the number of casts and the other symptoms were not marked. The morning labor began, the albumin was one fourth per cent. Chloral was given during labor, the first stage of which lasted eight hours. At the end of one and one half hours of the second stage, the albumin increased to five sixths per cent. Forceps were applied to terminate the labor, for fear of convulsions, and the child easily delivered. Four hours after labor, the urine became solid on boiling. Sixteen hours after labor, the albumin had decreased to one fourth per cent, there being a large number of granular, hyaline, and epithelial casts. Forty hours after labor, the number of casts was very much decreased, but for nearly a year there was a trace of

albumin. Immediately following the labor, half an ounce of sodium phosphate was given, also a quart of saline subcutaneously, and the patient put in a hot pack till she sweat profusely. Recovery following labor was uninterrupted.

CASE 4. A primipara, age 35, was referred by Dr. R. No albumin was found, nor were other symptoms present till three days before labor began, and then there was only a trace of albumin. The next day there was about one twentieth per cent. On the morning of the day of confinement, the albumin was about the same, and there were no casts. As the labor lasted only seven and one half hours, and as she had been in labor five hours when I first saw her, no specimen was obtained for examination during labor. After the birth of the child, an examination of the urine was made, and showed about nine tenths per cent of albumin and a few casts. The treatment adopted above was used, and at the end of twenty-four hours the albumin had decreased to one fourth per cent, and the number of casts was somewhat increased. The patient made a good recovery, and at the end of the month there was no albumin or casts.

CASE 5. A multipara, age 22. There were no symptoms of impending trouble till one week before labor, when she had all symptoms of toxæmia, except the presence of albumin. This appeared in two days, and there was about one eighth per cent. No casts were present. The regular treatment was adopted, the albumin decreasing to a trace and the other symptoms becoming much less marked. Labor lasted eight hours, and after it was completed there was one sixth per cent of albumin, which entirely disappeared in forty-eight hours. The other symptoms were gone within twelve hours after labor. The patient made an uninterrupted recovery.

If time would permit, I would report cases seen before these, in which symptoms were just as marked as in case 1, and in which the preliminary treatment was used. The patients were carried safely through the labor, but convulsions occurred later. Much was accomplished in preventing the convulsions till after labor, but at that time I did not use the precautions following labor advised above. If they had been used, convulsions might have occurred, anyway; but it is safe to say that they would not, as they did not come till several hours later — sufficient time to have accomplished good results from salines, hot packs, and chloral. The cases responded to the treatment and recovered.

Two cases seen in consultation at about the same time as case 3 showed no general symptoms of impending eclampsia, nor was there any albumin when the last test was made before labor; five days in one case, and two or three weeks in the other. No examination was made at the beginning of or immediately after labor in either case. One, a primipara, had a convulsion eleven hours after labor, and a second half an hour later. There was not a large amount of albumin and only a few casts at the time of the convulsions. The other case, a multipara, seen in a neighboring town, had a convulsion about twenty-four hours after labor, and another thirty hours after the first. Examination of urine showed one half per cent of albumin and hyaline casts. Both patients recovered, and in either case the convulsions might have been prevented if tests had been made and preventive treatment used immediately following labor. Another case, also in a neighboring town, about which I was consulted, had had convulsions in a previous labor. Her husband wanted labor produced this time. Albumin was present early, but the symptoms did not warrant interfering. When they became worse, the treatment used held them in check so successfully that it still did not seem necessary to interfere. Just about the expected time of labor, she began having convulsions. The uterus was emptied, and everything possible done to control the convulsions and eliminate the toxins, but to no avail, the patient dying about twenty-four hours after the first convulsion. Should labor be produced in a patient giving such a history? In the light of my experience in that case and since, I advise as follows: If albumin and symptoms of toxæmia occur early in pregnancy, empty the uterus. If not, then watch the case carefully, and if the symptoms appear, treat as suggested till the child is viable, and then produce labor. I do not think I should allow another case with such a history to go so long, even though there were no urgent symptoms. This case shows how any treatment may fail, but it also emphasizes the need of active treatment.

Every case of pregnancy has its own individuality, which must be reckoned with, and which may prevent success in our management of these cases. We cannot prevent toxæmia occurring in some cases, and we cannot prevent eclampsia in every case of toxæmia, but I am firmly convinced that there is far too little done to try to prevent them. I realize

that little if anything suggested here as treatment is new, but I realize just as truly that much of this is not always applied. As I look back on my earlier treatment of these cases, and as I consider the cases seen with others, two facts are evident. One of these is, that there is not sufficient watchfulness for toxæmia, and the second is, that the treatment adopted is far too often applied without system, and in a half-hearted way, as if we feared to touch the case.

To conclude, then: 1. The first step in the prophylactic treatment of puerperal eclampsia is so to manage our cases of pregnancy as to reduce to the smallest number possible the cases of toxæmia.

2. When our watchfulness has discovered that in spite of such management we have toxæmia, treat the case vigorously at the beginning, going to an extreme with it, and only terminating the treatment as the results of it justify.

3. When labor begins, examine the urine as soon as possible after reaching the case; examine again during and after labor. Begin giving chloral with the onset of labor, and continue till danger is past. If the symptoms are becoming more pronounced as labor advances, terminate it.

4. If, at the close of labor, symptoms are present, either of impending eclampsia, or even of a remote chance of eclampsia, treat the case as if the convulsions had already occurred, and in this way prevent the actual occurrence of many that will come if nothing is done.

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## WESTERN RESERVE UNIVERSITY

### Department of Obstetrics

# TRANSVERSE OR OBLIQUE PRESENTATIONS

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THE term "transverse presentation" indicates that position of the fœtus in utero in which the long axis of the child's body bisects the long axis of the uterus at an angle, in contradistinction to the normal position in which the two axes coincide, one or the other pole of the fœtus at the same time being situated over the pelvic brim. Strictly speaking, the term "transverse" should be used only with reference to the presentation in which the axis of the fœtus crosses the long axis of the uterus at a right angle, and the term "oblique" should be used in the much more frequent condition in which the axes form an acute angle with each other.

However, as a transverse presentation inevitably merges into an oblique as labor advances, there seems no valid objection to the former designation, especially as it is the one in common use. As the shoulder is, almost without exception, the part of the child's body which lies over the pelvic brim, and necessarily presents as labor progresses, the term "shoulder presentation" is used with reference to an advanced degree of the transverse. Hip, back, or umbilical presentations are possibilities, but are of extremely rare occurrence.

There are two methods of designating the position in which the child lies. In one, following Hohl's method, the description of the presentation depends upon the location of the child's head. In the first transverse, the head lies to the mother's left side; in the second, to her right side. As the back is nearly always directed either to the front or to the rear of the mother's body, the terms, "first dorso anterior or posterior," "second dorso anterior or posterior," are used to include all of the various positions the child's body may assume.

The first and second dorsoanterior occur in about equal proportion, while the back is directed anteriorly in about three fifths of all

cases. Another method depends upon the position of the shoulder, or rather its most prominent portion, the acromion. According as the shoulder lies to the left or right side of the mother, and as the back is to the front or rear, we have four presentations: Left acromio anterior or posterior, right acromio anterior or posterior. The first method is used by German, the second by English and American writers.

Transverse presentations occur in about one half per cent of all labors in the United States and Great Britain, and in about three fourths per cent of all labors on the Continent. According to Franqué, this difference in frequency may be due to the less frequent occurrence of contracted pelves and the greater attention paid to the hygiene of the lying-in period in the former countries.

The abnormality is met with far more frequently in multiparæ than in primiparæ, due to the relaxed abdominal and uterine walls of the former.

*Ætiology.* Conditions which favor an abnormal motility of the fœtus on the one hand, or which hinder or prevent the engagement of one of the fœtal poles in the pelvic brim on the other, tend to produce transverse presentations. Multiparity is the chief factor in the production of the first condition; abnormal motility of the fœtus resulting from the relaxed abdominal and uterine walls. The pendulous abdomen in multiparæ is an example. As a causal factor, may be included excessive anteflexion of the uterus from various causes, such as tight bands, continuous sitting position during pregnancy, gynecological operations, as ventrovaginal fixations, Alexander operations, etc.

Hydramnios, also, in allowing free motion of the child, and in preventing the normal action of the uterine walls, tending to fix the fœtus in the longitudinal position, is a not infrequent cause of the abnormality.

Under the same head may be included twin pregnancies, in which one child often lies transversely, and death of the fœtus, greater compressibility resulting from maceration.

In the second group, the most frequent cause is a disproportion between the head and the pelvis. Occasionally an oversized head fails to enter a normal brim, but, as a rule, the head is of normal size and the pelvis is contracted. As a result, the head is not firmly fixed, and easily slips to one side. Placenta prævia and intra-abdominal tumors act in the same way.

Other rarer causes deserving of mention are malformations of the uterus or of the fœtus, prolapse of fœtal extremities, and a too short cord. It is not unlikely that injuries, as from a blow or fall, may rarely be causal factors.

*Course of Labor.* If the presentation is not corrected by artificial aid, the natural forces may cause expulsion of the child in one of the ways to be described, or, much more frequently, labor may terminate in a neglected transverse presentation, resulting either in rupture of the uterus or in maternal death from septic infection.

*Delivery by the natural forces* may be brought about by the following procedures:

*Spontaneous Version.* The uterus at each contraction strives to resume its ovoid form and its upright position, partly through the hardening of the uterine muscles and partly by means of the round ligaments.

By these means the long axis is lengthened and the transverse axis is shortened. Thus the lower lying pole of the fœtus, usually the head, is brought into position over the pelvic brim, and labor proceeds in the usual manner.

Spontaneous version occurs most easily with a freely movable fœtus, and early in the first stage of labor, before the membranes have ruptured. It has occurred, however, although exceptionally, some time after rupture of the membranes, and even after the shoulder has entered the brim. A contracted pelvis is usually an insuperable obstacle to this maneuver. Prognosis for both mother and child is excellent.

*Spontaneous Evolution.* By this method the child's head is fixed in or above the pelvic brim, while the body and breech revolve around it, in contradistinction to spontaneous version, in which the fœtal body actually turns on its transverse axis. Spontaneous evolution occurs in two ways, by the method of Denman and that of Douglas. In the former, briefly, the evolution occurs while the head and shoulders are at the brim; in the latter, the evolution begins when the presenting shoulder

appears at the vulva and proceeds with birth of the shoulder and its ascent in front of the symphysis pubis. In Douglas's method more room is given, as the result of the freeing of the shoulder, for the evolution of the body than in Denman's method.

Spontaneous evolution requires extraordinarily strong uterine contractions. It is favored by a wide pelvis, by the soft, distensible birth-canal of multiparæ, and by a small-sized, easily compressible fœtus. It occurs especially when the labor is premature or the fœtus is macerated, although cases are recorded of fair-sized living children born in this manner, and of primiparæ with contracted pelves, who gave birth to full-term recently dead infants in the same way.

Some English writers, notably Jardine and Herman, use the term "spontaneous rectification" in the sense in which the Germans use "spontaneous version." Denman's method is called spontaneous version and Douglas's method is considered as true spontaneous evolution. The contention of the Germans appears to be supported by the stronger arguments.

All agree on the fourth and last method, however; viz., spontaneous expulsion, or partus conduplicato corpore, in which the child is driven through the pelvis doubled up, whereby the chest and belly are first delivered, followed by the head and legs. This method is possible only in dead and premature children with greatly macerated bodies. It occurs in about two and one half per cent of all transverse presentations. From statistics obtained in over 2,000 cases of this abnormality, spontaneous evolution occurred in .6 per cent, and it is said to occur in .004 per cent of all presentations. It is impossible to estimate the frequency of spontaneous version, as a large number of cases undoubtedly occur without observation.

In unassisted cases, if spontaneous version does not occur, the usual course of labor is as follows: The membranes are apt to rupture early in the first stage, as the protection given to them by the ball-valve action of the head is lacking. After rupture occurs, the amniotic fluid drains away easily and completely, since no obstruction is offered by a fœtal part and the os uteri again contracts, dilating later slowly and incompletely.

The uterine wall now contracts directly upon the body of the fœtus, and molds itself to the shape of the child. The body and breech are pushed closer together, the vertebral column is bent in a downward direction, forming an angle at the neck, thus bringing the shoulder into the brim. This now forms the presenting part, and the transverse has been transformed into a shoulder presentation. The shoulder is gradually pushed deeper into the pelvis by the uterine contractions and by the powerful pressure of the abdominal muscles, and the corresponding arm is released from the body and appears at the vulva. This is the stage of neglected transverse presentation, or "Verschleppte Querlage" of the Germans. As a rule, further progress of the child is impossible. In spite of the insuperable obstruction, however, uterine contractions continue with increasing violence and frequency. Since the fœtus cannot descend, the fundus pulls up and stretches the lower uterine segment and cervix, thus expelling the greater part of the child from the uterine cavity, so that it lies in the greatly overstretched cervix and vagina, the fundus sitting like a cap upon the child's breech. This condition is in the highest degree dangerous. If only a very slight increase in size of the contents of the overstretched birth-canal occurs, as by introduction of the obstetrician's hand or if a last powerful contraction of the uterus stretches the distended tissues still further, they suddenly give way, usually at the height of a pain, and rupture of the uterus occurs, fatal always to the child, and nearly always to the mother. As a matter of fact, rupture does not often occur. According to Freund, only one fourth of all uterine and vaginal ruptures are due to transverse presentation. Usually, the uterus passes into a state of tonic contraction, the child dies, the mother becomes infected, and finally dies of sepsis.

*Prognosis.* With reference to prognosis, Franqué well says that if the mother's life depended upon birth by conduplicato corpore or spontaneous evolution, the mortality in transverse presentation after rupture of the membranes would be 95 per cent, and of the children, about 99.9 per cent. The results of

treatment, therefore, are to be included among the most satisfactory in medical art, and if artificial aid is undertaken at the proper time, in uncomplicated cases all mothers should be saved. The mortality rate of the children naturally depends upon the unavoidable dangers incident to necessary operations. Beyond question, the safety of the mother and child depends, in the vast majority of cases, upon timely interference, and this can only be afforded when the abnormal position has been recognized early in labor, or, better yet, before labor begins. Hence the supreme importance of a correct diagnosis at the earliest possible moment.

The *diagnosis* of transverse presentation can be established during pregnancy and in the beginning of labor only by external examination. Often, observation reveals the fœtal axis deviating from side to side, the mother's body appears broader than normal, and the uterus, during a contraction, appears stretched in its broad axis. Palpation reveals on each side a large fœtal part. The head responds to ballottement, and is very hard. The pelvic brim is empty, hence the fingers may be pressed behind the symphysis deep towards the promontory. In dorsoanterior position, the back is easily felt; in dorsoposterior, small fœtal parts may be felt beneath the abdominal walls. The fœtal heart may be heard lower down than in vertex presentations, and towards the child's head.

On internal examination, before rupture of the membranes, no presenting part is felt, and the brim is found empty. This, of itself, is of great significance, and confirms the suspicions aroused by external palpation.

Occasionally, through the membranes, a small fœtal part may be felt. The arm may be recognized by its slow motion, the foot by its quick, lightning-like impulse. Rupture of the membranes, during the examination, must be guarded against with greatest care. Sometimes this is intentionally brought about, especially by midwives, in the hope of the better coming to a decision as to the diagnosis.

It is better, according to Franqué, to be uncertain as to the position, rather than to subject mother and child to the increased danger from a too early rupture of the membranes. Only after rupture of the membranes is the presenting part, almost always the shoulder, to be felt.

At this time, external palpation may be without result, due to the firm contractions of the uterine and abdominal muscles. The diagnosis depends then entirely upon internal examination.

The shoulder is usually easily recognized, the examining finger passing into the axillary space and palpating the ribs. The head lies on the closed side of the axilla, the breech on the open side. Palpation of the ribs decides the direction of the fœtal back, as they are plainly felt only on the ventral surface, being covered on the dorsum by the scapula and thick dorsal muscles. Sometimes only the clavicle on one side and the scapula on the other can be felt. If these landmarks fail, then the half-hand should be passed along the ribs to the spinous processes of the vertebræ, which are easily palpable under the skin, and settle all doubts as to the position of the back.

If the hand presents, it can be distinguished from the foot by the absence of the heel, by the difference in length between thumb and fingers; the thumb can be easily flexed into the palm or extended at a right angle to the hand, while the big toe does not have this range of motion.

Prolapse of the arm renders the diagnosis much more easy. To determine which arm is present, Bumm advises placing the hand with the volar surface directed upward. If the thumb points to the mother's right side, it is the right hand; if to the left, it is the left hand. This rule holds good, whether the hand is held in pronation or supination. An older but less practical plan is to assume the position of shaking hands with the child. The hand of the child will be identified as right or left, according as it fits the right or left hand of the obstetrician.

The hand being known, the side on which the head lies is determined from the closed side of the axilla. From these data the diagnosis of the entire presentation is easily made.

*Treatment.* A transverse presentation, if discovered in the latter weeks of pregnancy, should be altered to a vertex by external manipulation, and a firm binder should be applied,

to be worn until labor begins. Pinard has devised a binder provided with inflatable pads for this purpose.

In the beginning of labor, if the membranes are still intact and the fœtus is movable, external version by manipulation of the head and breech through the abdominal wall is often easily performed. That part which lies nearest the brim, usually the head, should be pushed downward. If the os is considerably dilated, the membranes should be ruptured, in order to fix the presenting part. If this is not the case, a binder should be applied, and the woman should lie upon the side toward which the head was deviated. If this maneuver does not succeed, a waiting policy should be assumed until the os is fully dilated or dilatable. To preserve the membranes intact, or to retain as much of the waters as possible after a recent rupture, it is advisable to insert a colpeurynter into the vagina, or if a hasty delivery is imperative, into the cervix, with a weight attached. When the os is fully dilated, bipolar or podalic version should be performed. The latter is usually preferred.

Neither method of version is indicated in presence of ruptured membranes with narrow os. The latter should be dilated with the rubber bag, or manually. On the other hand, no particular harm results if one waits until the natural forces fully dilate the os, as Winter and Dohrn have shown that neither does the shoulder become impacted nor does the uterine wall become firmly contracted about the fœtus until after full dilation of the os. If, however, the latter course is followed, one must be sure to seize the psychological moment for turning, as the shoulder sometimes becomes impacted in a surprisingly short time. After version, the child should be extracted as soon as possible.

In neglected shoulder cases, the danger from version is enhanced the longer the amniotic fluid has drained away and the more intimately the uterine wall is molded to the body of the fœtus. The shoulder becomes impacted and the prolapsed arm greatly swollen and discolored. Complete relaxation of the patient having been produced by an anæsthetic, a careful attempt should be made by combined manipulation to free the shoulder; at the same time it should be ascertained whether a version is possible without endangering the integrity of the uterus and birth-canal. Under chloroform, and with the patient on her side, version may often be safely performed many hours after the loss of the waters.

In tetanic contractions, with threatened rupture of the uterus, version should not be attempted, as it will almost certainly result in rupture. In rare instances it may be possible, by forcibly pulling upon the prolapsed arm, to deliver the child by Douglas method of evolution. With this exception, embryulcia or decapitation should be performed. If the neck can be reached, it should be severed, the body delivered, and the head finally by forceps or the cranioclast. If the neck cannot be reached, evisceration and spondylotomy should be done. Rarely, the blunt hook may be used forcibly to deliver the breech by evolution

Cæsarean section is indicated only in absolute pelvic contraction, unless it be undertaken at the urgent request of the patient and her family, after they have been fully advised as to the contraindications.

The following cases may serve to illustrate some of the foregoing points.

CASE 1. Primipara, age 23. The patient was first seen about the middle of the first stage of labor. The head was found, on external manipulation, lying in the left iliac fossa, and the child was in the first dorso-anterior position. What seemed to be the head of another child was found in the right upper quadrant of the abdomen; hence a twin labor was diagnosed. Under constant observation, labor progressed normally, and at the end of six hours the os was fully dilated and the membranes were intact. The head was easily pushed from the left side to a position directly over the brim, the membranes were ruptured, and the head became at once engaged. In an hour the child was born naturally, in right-occipito anterior position. What appeared to be the head of a second child proved to be a fibroid tumor, just the size and hardness of a child's head, attached by a pedicle to the fundus uteri. Three months after labor this tumor had entirely disappeared; at least, a careful bimanual examination gave no evidences of any abnormality.

CASE 2. A primipara, 25 years old. I was called to see the case by a physician, who reported that he had diagnosed a transverse presentation, with the head on the left side. When I examined the patient some hours later, I found the head engaged in the brim, in right-occipito anterior position, membranes intact, and the os one half dilated. After a long, tedious labor, midforceps were applied, and a living child was easily delivered. If the physician was correct in his

diagnosis, and I have no doubt that he was, this was a case of spontaneous version.

CASE 3. A primipara, age 19. On examination of this patient at St. Ann's Maternity, one month previous to labor, no abnormality was discovered. The pelvis was normal in size. Shortly after she fell into labor, abdominal palpation revealed a transverse presentation, in first dorsoanterior position. Vaginal examination gave negative results. Attempt at external version failed. Labor was allowed to proceed until the os was dilatable, when version was done easily by Dr. H. H. Powell. The head rotated to the rear before delivery, and on account of the difficulty of extraction, the child was dead-born. The mother made an uninterrupted recovery.

CASE 4. A multipara, age 33. The patient had had seven children, several of which had been delivered with forceps. She had been in the present labor for two days, being attended by a midwife. The membranes had ruptured thirty-two hours before I saw her. The midwife did not recognize the abnormality until the hand appeared at the vulva. She then called in a physician, who endeavored to deliver by pulling upon the arm. When I reached the house, the right arm was prolapsed, and was very much swollen and congested. The fœtus lay in the first dorsoanterior position, and the uterus was firmly contracted about the child. Under deep narcosis, it was found possible to push up the impacted shoulder and turn the child without great risk to the mother, as the lower uterine segment was not greatly dilated. Version was materially assisted by traction on a fillet slipped over the foot after it was brought down. Although the child was dead before version was undertaken, this was done, both because it appeared perfectly safe and because we were not provided with instruments for embryotomy, since I had not been advised as to the nature of the case. This patient passed through a normal puerperium. When seen some time later, she was found to have very relaxed abdominal walls, with gastroptosis and prolapse of the right kidney.

CASE 5. Mrs. W., age 30, a multipara. She was brought into St. Ann's Maternity with a neglected transverse presentation, the shoulder impacted and the right arm prolapsed. It was learned that she had been in labor for seven days, and that the membranes had ruptured early on the first day. Strange to say, the lower uterine segment did not appear to be greatly dilated. With greatest care, the shoulder was pushed up, and version was easily performed. However, it was found impossible to deliver the head, as it was encircled by a most firm, constricting band of uterine muscle, but whether internal os or not we could not determine. Craniotomy on the aftercoming head was necessary to release it. The woman apparently suffered no ill effects from her remarkable experience. One and a half years later she gave birth to a seven-pound child in normal position, labor lasting only about three hours. An examination two weeks before labor showed the position to be a vertex. No cause could be ascertained for the previous transverse presentation.

CASE 6. A case of spontaneous evolution in a seven-month syphilitic, macerated fœtus according to Douglas method.

CASE 7. A case of conduplicato corpore. The patient, a primipara, age 25, had been in labor for 28 hours. The membranes had ruptured early. She was brought to the hospital with the arm prolapsed. Before preparations could be completed for an examination, the patient expelled a fair-sized, dead fœtus. The shoulders were delivered first, then the trunk and head, the latter pressed deep into the abdomen, followed by the legs. The body did not unfold at once, so that a good opportunity was given to observe the position in which the fœtus passed through the birth-canal.

CASE 8. A multipara, age 35. She had been in labor twelve hours. The fœtus was in fourth dorsoposterior position, with prolapsed arm. During the version one leg in some way became rotated to a position across the child's back, forming an insuperable obstacle to delivery until it was released by very difficult manipulation.

CASES 9, 10, and 11 were uncomplicated, neglected shoulder cases with prolapsed arms, in which versions were performed easily.

Of the eleven mothers, all were saved, and not one contracted septic infection. Of the eleven children, the only one born alive was in the case of external version.

Of the other ten, only one was alive when version was begun. The others had been dead some hours before the operation.

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# THE DIAGNOSIS AND SURGICAL TREATMENT OF TUBERCULOSIS OF THE KIDNEY

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TUBERCULOSIS of the kidney, in most instances, must be considered a surgical disease, and when localized in one kidney, like localized tuberculosis elsewhere, can be completely eradicated. So much has been written lately in detail on this subject, that, in reporting our clinical results, I shall refer only briefly to the different phases.

Quoting from Walker's excellent article on this subject, Morgagni, in 1767, was first to describe tuberculosis of the kidney with sufficient clearness to show that he knew the real nature of the disorder; then Bayle recorded with great clearness and accuracy an instance of tuberculosis of the kidney and bladder. John Howship, in 1823, reported two cases of tuberculosis of the kidney and bladder in a boy and woman, respectively. Craigge seems first to have observed tuberculosis in both kidneys. After his description no clear records are found until 1841, when Rayer contributed a number of articles with colored drawings, the beauty and accuracy of which have not been surpassed to the present time.

The first instances of primary renal tuberculosis reported were by Lancereaux in 1871. Bahes, in 1883, was first to find tubercle bacilli in the urine. Durand, Fardell, and Cayla, by experimental work, were first to demonstrate the possibility of tuberculous infection of the kidney through the blood-current. Dufour, Lancereaux, Guyon, and Tuffier in Paris, and Morris and Roberts in Engand, established the principal clinical symptoms and diagnostic points. Kuester and Israel in Germany have done much to advance renal surgery, and have confirmed the theories of others by proving that the disease may be primary in the kidney. Wolcott in 1861 and Spiegelberg in 1867 were first to perform nephrectomy through the abdomen. In 1871, Simon first excised the kidney by the lumbar route. In 1872, Peters was the first to remove a tuberculous kidney.

*Pathology.* Both clinical and experimental evidence points to the hæmatogenous origin of tuberculosis of the kidney probably in all cases. The entrance of the tubercle bacilli occurs through the respiratory or alimentary tract. In this way they enter the blood and produce a localized tubercular process at the most favorable points. Such points are areas where there are large quantities of blood and a slow current, as the glomeruli of the kidney and the epididymis. Slight traumatism at either place will also act as a predisposing cause, as has been so well shown by Brewer's recent report. The descending process is well shown in the following cut, which represents a tubercular kidney removed from a young man one year ago. It will be noted in this specimen that the pelvis of the kidney and the upper portions of the ureter contain numerous tubercular ulcers, that they gradually decrease and entirely disappear in the lower portion of the ureter. In this case there was no involvement of the bladder. Cases are on record where the kidney has become involved by direct invasion from tubercular processes in the vertebræ (Patier, Morrel, Hollingsworth, Tuffier, and others).

Writers differ as to the frequency of renal tuberculosis, some maintaining that it is not uncommon, others that it is comparatively rare. Report of morgue records of the Presbyterian Hospital, New York City, from February 1, 1893, to May 1, 1896, shows total number of pslea, sie 8567; total showing tuberculous soution 12 per cent. Four per cent of these showed infection of one or both kidneys.

In ten years at the Middlesex Hospital, 44 cases of tubercular disease of the kidney were

found in 2,610 examinations. In our series of all kidney cases, those of my associate, Dr. G. W. Crile, and myself, 20 per cent were tubercular. Until recently, however, the percentage of tuberculosis of the kidney of all surgical cases of which we have records was very small. Within the last few years, however, the proportion has increased very materially.

*Age.* Keyes says renal tuberculosis is a disease of youth. Its more acute forms occur during adolescence, while its chronic, caseating forms are usually encountered between the ages of 20 and 40.

Israel states that 80 per cent of his operations for tuberculosis of the kidney were performed upon persons between these ages.

Morris tells us that the extremes of age at which the disease was observed in the kidneys were 2½ months and 64 years. Albarran cites 16 special cases, all between the ages of 23 and 44.

F. Tilden Brown gives extremes of age as 2½ months and 74 years.

Walker's analysis of 373 cases of renal tuberculosis, quotes Winternitz with two cases at the age of 7 months.

The greatest number of cases in Walker's list of 373 was between the ages of 20 and 30, the next greatest number between 30 and 40.

Report of Facklam's cases (108 patients) gives ages as follows: 1 to 10 years, 7 per cent; 11 to 20 years, 9.4 per cent; 21 to 30 years, 37.6 per cent; 31 to 40 years, 37.6 per cent; 41 to 50 years, 7 per cent; after 50 years, 1.2 per cent.

Krönlein, in giving statistics of 51 cases, gives ages as, 17 to 20 years, 7 cases; 21 to 30 years, 23 cases; 31 to 40 years, 14 cases; 41 to 50 years, 6 cases; 51 to 60 years, 1 case.

In our list of 24 cases, the youngest was 18 and the oldest 42, the average being 28.5.

From the forgoing statistics it is to be noted that tuberculosis of the kidney is encountered more often between the ages of 15 and 35.

*Sex.* Israel says women are especially liable to renal tuberculosis, while Dr. Comet of Berlin writes that, according to most authors, men are more often diseased than women. Eichorst however, had 16 men and 22 women among 38 cases of tuberculosis of the kidney, notwithstanding the fact that the total number of female patients was considerable smaller than the male. In Walker's report, out of 386 cases there were 182 men and 204 women. Kümmel says that of 48 cases, 38 have been women and 15 men. Krönlein states that renal tuberculosis affects women three times more often than men. König cites 18 cases, 12 of which were women. Israel further says that of all cases of renal tuberculosis, 66⅔ per cent were women. Guyon is of the opinion that it occurs more frequently in men than women, but the majority of Guyon's patients are men. I think there is no doubt that renal tuberculosis is found almost twice as often in women as in men.

*Social Condition.* The proportion of single to married is about 5 to 3.

*Hereditary Tendency.* This does not seem to play a very important role in this disease. Less than one-fourth of our own cases gave any tubercular family history.

*Right or Left Side.* Of Walker's series, in 216 cases the right kidney was affected 111 times; the left, 96 times. There does not seem to be any anatomical reason why the right should be affected more frequently than the left. This fact might, however, make it somewhat difficult of diagnosis if attempt at diagnosis were to be made without catheterization of the ureters, for the right renal colic that is often present might be mistaken for a disease of the gall-bladder or the appendix.

Israel states that rarely is the disease double, and further states that 90 per cent of his cases were unilateral, while Morris says that both kidneys are affected in about half the total number of cases, but not to an equal degree, so that when patients first come under treatment unilateral renal tuberculosis is no doubt much more frequent than bilateral. Sherrell says both kidneys are affected in two thirds of the cases when a general tuberculosis coexists, while, where the lesion is limited to the kidneys, in the majority of cases it is unilateral. Millet, in reporting the cases operated upon at St. Mary's Hospital, Rochester, Minnesota, states that only two were bilateral. Hunner estimates that 92 per cent in his series were unilateral 4½ years after symptoms began. Of our own series, both kidneys were involved in five cases.

*Symptoms.* There is no one class of symptoms that is universally present in tuberculosis of the kidney. Israel gives as symptoms, fever, emaciation, pains, pyæmia, anorexia, diarrhœa, rectal tenesmus, and micturition disturbances. *Gazette des Hôspitaux* states that the symptoms at the start may be vesical (frequent, painful micturition) or renal (lumbar pains and hæmaturia), modification of urine both as to quality and quantity, polyuria at the beginning and oliguria at the end. It further states that hæmaturias are quite frequent; that they are spontaneous; that rest does not help them nor does walking augment them; and that they are not painful; that the urine is opaque and contains pus and is acid; that some albumin is present; that the urea, chlorides, and phosphates are diminished; pains may be lacking absolutely or may exist from the beginning, so intensely as to simulate renal colic. Millet says that renal tuberculosis is prone to be painless; that when pain is present, it is due to some accident or complication, rather than to the disease.

Sharpless says remitting attacks of frequent urination should attract our attention; that, during the last stages, chills, fever, and sweats are common.

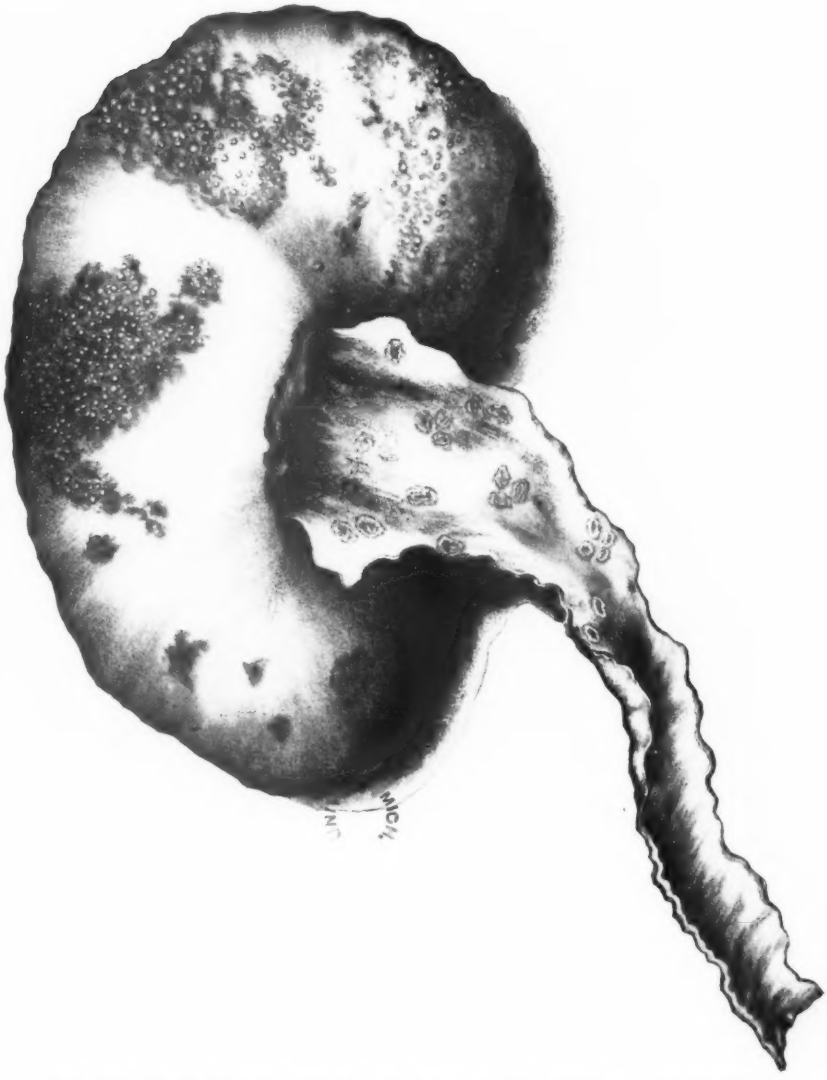
Drs. Prescott and Goldthwaite's report shows an extraordinary symptom in a man with left tubercular kidney; that of the left leg drawing up. In one of my own cases, that of a woman, there was often, just before a renal colic attack, a sharp pain on the inner side of the left knee and a feeling of coldness about the left knee most of the time, but this was most pronounced just before the renal attacks began. Legen says pyuria has these characteristics; it is spontaneous, constant, lasting, and seemingly without cause; and yet Monel found at an autopsy two large tubercular abscesses, one at each pole of the kidney, which did not communicate with the pelvis, and there were no symptoms during life.

In our own series of cases, the one symptom upon which so much stress is laid by many authors, that of hæmaturia, was present in only a single case, but, on the contrary, pain, which Millet says is not present as a rule, was present in twenty-five per cent of the cases. In five, the first symptoms to call any attention was the severe renal colic; in two others, heaviness and soreness in the lumbar region was the pronounced symptom at the time the case came under observation. The one symptom that was present in almost every case was vesical irritation. This may come on very spontaneously, as in case 10, that of a woman aged 30, who considered herself in robust health, and while away on a visit suddenly began to have frequent urinations. This was followed by a very annoying burning sensation. This gradually became worse, pus increased in the urine, and on examination tubercle bacilli were found. In not all cases does the bladder irritation continue, but frequent urination compelling patients to get up at night, was present in more than ninety per cent of our cases. One symptom noted in all men was a burning sensation in the perineum after urination. This was very annoying, and in one or two cases it was described as an itching sensation.

A general feeling of malaise, occasional slight temperature, and increasing palor, are generally the forerunners of the invasion. These conditions may be present for months before any bladder or renal symptoms manifest themselves.

*Diagnosis.* After all, the most important point in tuberculosis of the kidney is an early and correct diagnosis. No single or combined chain of symptoms is always present for an absolute diagnosis. The pathognomonic sign, of course, is the presence of tubercle bacilli, but these are not always easily determined, and it must be remembered that the smegma bacilli also stain red, and as Young and Cushman have pointed out, careful discrimination is necessary, that a wrong diagnosis is not made on the presence of the smegma bacillus. When tubercle bacilli are found in the urine, their source must be correctly interpreted, for they may come from other parts of the genitourinary tract than the kidneys.

For the purpose of correctly interpreting the source, the cystoscope and the ureteral catheter is the best known method. Such authorities as Albarran, Bazy, Tuffier, Sharpless, Meyer, Brown, Lorenzo, and the strongest advocate of all, Casper, recommend ureteral catheterization as the greatest aid in diagnosis.



Tuberculosis of kidney showing the descending process of the infection. The pelvis and upper part of ureter contain many tubercular ulcers which gradually become less, entirely disappearing in the lower portion of the ureter. Kidney removed from case 5 of the series.

Casper reviews the known diagnostic measures, and says that he considers positive results after guinea-pig inoculation the most important, and in determining the condition of each side, catheterization of the ureters is essential.

Ware says it is an axiom that painless pyuria in adults between 20 and 40, which is associated with symptoms of bladder irritability, and which does not yield to ordinary treatment, is, in all likelihood, tuberculosis of the bladder, dependent upon renal lesions. It is upon this particular point that I wish to lay special emphasis, for it is here that the delay occurs in completing the diagnosis. Many physicians are inclined to agree with their patients in believing that the trouble is only a slight bladder irritation, and that it will soon cease. Day after day goes by, and the case is not much worse, or, as a rule, very little better. All the known remedies of the physician are exhausted; the quacks try their hand, and in one of my own cases an osteopath manipulated a double tubercular pyonephrosis until I feel sure he had thoroughly disseminated the tubercular process through the circulation.

Patients with pus in the urine, where the cause cannot be traced to direct infection from without, should at once be submitted to more complete examination until all means have been exhausted in making the diagnosis. If tubercle bacilli are not readily found, guinea-pig inoculation should be resorted to if there is much doubt. I do not feel, personally, that it is always absolutely necessary that the tubercle bacilli should be demonstrated, although they should always be sought for. A surgical kidney can be diagnosed, and if there is no history of external infection and no renal calculus present, which the X-ray will usually disclose, the only other condition that will be likely to occur will be tuberculosis.

I have repeatedly searched, day after day, for the tubercle bacilli, and have not found them, and perhaps on a fifth day have found them in great quantities. This was especially true in case 8. This case had been under the observation of some of the best diagnosticians in the city, and repeated urinary examinations failed to reveal the tubercle bacilli, when suddenly they began to be present in very great numbers, — in fact, more abundant than in any case I have yet seen. The operation disclosed a kidney full of pus-cavities. I hardly know how the prolonged absence of the tubercle bacilli could be explained, unless some of the pus-pockets did not empty directly into the pelvis until the time that we discovered the tubercle bacilli.

In 17 cases that I have personally had under observation, the tubercle bacilli were found eleven times. In several cases they were found by the physician in charge, and the case referred to me for ureteral catheterization and operation. In the rest of the cases a surgical kidney was diagnosed, and the positive diagnosis was made at the time of the operation, although the presumptive evidence was all in favor of tubercular process.

Our method of making a diagnosis where pus is present in the urine is, first, to ascertain the source of the pus, to find if the pus comes from any diseased condition of the urinary bladder not attributable to infection from the ureters or kidney; as, for example, a growth, stone, or ulcer of the bladder. If this is not found as the source, the uterers are catheterized and the two sides compared. If the pus is found to come from one side and not from the other, the pus is carefully examined for tubercle bacilli. If found, the diagnosis is conclusive. If the tubercle bacilli are not found, an X-ray picture is taken to see whether or not the cause of the pus might be a stone. If the stone is not present, further examinations for tubercle bacilli are made, and if not present, guinea-pig inoculation is resorted to, if it is considered wise to wait so long. From the separate specimens of urine not only is the source of the pus obtained, that is to say, which kidney is diseased, but the functionating capacity of the supposedly healthy one is also determined. This is done by cryoscopy, or freezing of the urine. While I am aware that many fallacies have been pointed out in the freezing-point of the urine, in our own series of cases, where we were able to collect the separate specimens and make comparisons, a most striking difference has occurred in all the tubercular cases, and I desire especially to call attention to some of them.

In case 6 the freezing-point of the right

was −1.86; left, −0.94. Case 7, right, −1.58; left, −0.74. Case 8, right, −1.44; the left, −0.54. Case 9, right, −1.44, left, −1.08. Case 10, right, −1.03; left, −0.53. Case 13, right, −2.12; left, −1.44.

In one case only, case 4, the right froze at −0.14, and the left at −0.18. This was the only case in which the comparatively healthy kidney froze lower than the diseased one, but this is often observed where great dilution of the urine is brought about, as it was in this case. The patient had been requested to drink large drafts of water for twenty-four hours before the examination, and the urine was extremely dilute. This observation has been made by others, and it is found that the diluting power of the kidney, as well as the excreting power, is lessened on the diseased side; that is to say, a diseased kidney does not dilute as readily as a healthy one.

Another point in the diagnosis to which I wish to call attention is the appearance of the mouth of the ureter and the tubercular ulcerations in the bladder. It was noted in some of these cases that the tubercular ulcers were found lying beyond the ureteral opening on the diseased side. This, I think, can be explained by the accumulation of tubercular urine at this soculated point. In one or two instances the bladder was not involved, except about the ureteral opening. In one case the lips of the ureteral opening were ulcerating; in another, case 5, there was a great bulging and pouting about the ureteral opening, and pus could be seen coming from the center. In this case the uterers were not catheterized, but a surgical diagnosis, probably tubercular, of the right kidney was made, simply from the pus in the urine, and the appearance of the right ureteral opening, and especially from the double epididymitis present.

Many clinicians do not recommend catheterization, but depend entirely upon the appearance of the ureters and the area about the ureters, to determine from which side the pus comes. I make it a rule, wherever possible, to do the catheterization, for in that way alone can we determine the functionating capacity of each kidney. The value of this is better shown in Casper's report of 129 nephrectomies, with a mortality of 21.7 per cent without the use of the ureteral catheter for diagnostic and functional determination, and 130 nephrectomies, with a mortality of 10 per cent, where the ureteral catheter was used.

*Prognosis.* In unilateral tuberculosis of the kidney the prognosis is good, and even with bladder involvement many cases recover after removal of the diseased kidney, and all tubercular bladders improve, for a while at least, when nephrectomy is done. When, however, both kidneys are involved or other organs affected, only temporary relief from the vesical symptoms may be expected.

In our series of cases, the kidney was operated upon in 19 cases; in 17 cases by ourselves, in 2 by other surgeons; 5 cases were not operated, 2 had involvement of both kidneys, 2 others had pulmonary complications, and 1 is still under observation. Four have died, one case, 1½ years after the operation, died from general tuberculosis. The second case was a case of double tubercular pyonephrosis, in which a nephrotomy was done and only temporary relief given. This case died subsequently, of uræmia, eight months after the nephrotomy. The third case died six months after the operation, but in this case there was quite extensive pulmonary involvement at the time of the operation, and she died from pulmonary and general peritoneal involvement. The fourth case died six months after the nephrectomy, from pulmonary tuberculosis. She, also, had rather marked tubercular process of the lungs at the time of operation, and the operation was done more to relieve the vesical symptoms than in the hope of complete cure. The longest time since the operation of any living case is eight years. This was a case of Crile, and at last report she was in good health. The other cases range from 5, 3, and 2½ years down to a few months, and all of them seem to be in fair health and give promise of complete recovery.

Of course, the prognosis depends upon the other organs involved. In the early cases where a single kidney is involved, the prognosis is extremely good, and even in cases of large pyonephrosis of the caseous variety, where there is no bladder involvement, the prognosis is generally good.

*Treatment.* Little or nothing can be done

in a medical way. Albarran challenged the Academy of Paris to show an authentic case cured medically. In all unilateral tubercular kidneys, nephrectomy is the mode of treatment; the earlier it is done, the better the prognosis. In all double involvement of the kidneys, when one is decidedly worse than the other, and when the least involved can be demonstrated sufficient to carry on life, nephrectomy gives greatest relief, and in many instances the remaining kidney improves. In double involvement, where there are large pyonephroses, nephrotomy is the mode of procedure. In all cases the general health must be given every consideration. The chief sources of danger from the operation are shock and insufficiency of the remaining kidney; in the first, prevention is better than treatment, and all the precautions to prevent it must be observed; for the second, the sufficiency of the remaining kidney, the same rule must be applied. The function of the kidney should be ascertained before, and not after, the operation. This can be done by ureteral catheterization and cryoscopy. The mortality rate from the operation depends upon a strict observance of these two rules. Different operators show different percentage of death; Israel, 10 per cent; Vignon, 29 per cent; Garcan, 17.4 per cent; Krönlein, 5.8 per cent; Morris, 35 per cent; Lorenzo, 4 per cent; Albarran, 4 per cent. In our own cases we have not had a single death as a result of the operation.

The lumbar incision is the one we have employed in operations on the kidney; a free enough incision should be made so that the kidney can be removed with just as little manipulation as possible. Where large, thin-walled abscesses are present and are broken at the time of operation, and the pus comes in contact with the freshly cut wound, the wound, as a rule, becomes infected, and more or less absorption takes place. This is followed by a high fever, and may cause a general tubercular involvement.

It may be advisable in some cases to cut down and ligate the vessels through an abdominal incision before making the lumbar incision, as advocated by Walker. I have used a clamp for temporarily closing the vessels, after the method of Crile in closing the carotids, in several cases, and this, where it can be done, is, I think, a decided advantage. The clamp is first put on before the kidney is much manipulated, then during manipulation of the kidney it will prevent any further squeezing of the tubercle bacilli into the circulation. It also has this advantage, that a bloodless nephrotomy may be done, the kidney explored, and stone, if present, removed, and the kidney sutured before the clamp is taken off. Unfortunately, where the kidneys are very adherent and the vessels not easily freed, this method is not applicable. The ureter should be removed as far down as it seems involved. In some cases the entire ureter and part of the bladder should be removed. However, resection of the bladder wall does not give much promise, but with a liberal incision the ureter can be removed almost its entire length. The stump should be cauterized with pure carbolic acid, and drain inserted down to the stump. Great care should be taken to preserve the nerves, and if severed, they should be immediately sutured. This will often prevent the extensive hernias that at times follow nephrectomy.

We believe that by early recognition and careful operation, the mortality rate can be kept low.

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# HEBOTOMY (PUBIOTOMY)

## An Operation for the Enlargement of Contracted Pelves

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IF one glances over the recent history of obstetrics and notices the development which has taken place, he will see that the advance has been, to a large extent, along surgical lines, although one might say that scarcely a single theme of any importance has remained entirely undisturbed and unchanged by recent investigations. The efforts which have been put forth have been more and more in the interest of the child, with the special aim of eliminating that operation which all obstetricians wish to avoid, namely, craniotomy upon the living child. At the present time the subject which holds the center of interest, both on account of its comparative newness and the extensive possibilities of its usefulness, is that of 'pubiotomy," also known as " hebotomy," an operation which consists in cutting the pubic bone at one side of the symphysis, and which is tending radically to change the methods heretofore used in cases of contracted pelvis.

The principle of enlarging the pelvis by cutting through some portion of the bony ring is an old one, and for a time after the introduction of symphysiotomy, this operation was thought to serve a great purpose. But because of the bad results for the mother from its use, due to injuries of the bladder and urethra, or to faulty union of the bones, so as to produce a waddling gait, or to other causes, it fell decidedly into disfavor. This was especially true after the development of the technique of Cæsarean section and a consequent lowering of the mortality rate, so that one might say that at the present time symphysiotomy is practically never performed in this country.

However, recognizing the advantage of the principle of enlarging the pelvis, Gigli, an Italian, suggested in 1894 an operation which would retain all the advantages of the symphysiotomy and at the same time do away with all its dangerous features. This operation consisted in sawing the pubic bone at one side of the symphysis by means of a fine wire saw devised by Gigli for the purpose, and known as the Gigli saw. Although first suggested by Gigli, the operation was performed for the first time on a living subject by Bonardi of Lugano in May, 1897. Two years later, in July, 1899, Calderini, in Bologna, again performed the operation, and two years after this, in August, 1901, Van de Velde, in Haarlem, performed it, while Gigli himself first had the opportunity of doing it in April, 1902, eight years after he had advised its use. Although the results were good from the start, the cases at first were very few, and it is noteworthy that with the early history of the operation were associated mostly Italian names, a thing which has been true of several of the most important recent developments of obstetrics.

In 1903, Gigli collected twelve favorable cases of the following men: Bonardi, Calderini, Van de Velde (two cases), Gigli, Scarlini, Saladino, Pestalozza (three cases), Leopold Myer, and Ferrari; and two fatal cases of Baumm, in both of which the patients died of sepsis. With the introduction of the operation into Germany during the next year, and the marked development to the technique, largely by Döderlein, the reports of cases began to come in from all sides, and despite the fact that the operation has now been done in practically all of the important German clinics, the results have been remarkably good, and the operation is constantly growing in favor.

The operation as first performed was an open one, and consisted in making a large verti-

cal incision to expose the pubic bone and then sawing through the bone. Döderlein so modified the technique as to make the operation an almost subcutaneous one, and since his technique is the one most nearly followed in the various clinics, it will be fitting to describe it here.

After the usual preparations, a small incision is made along the upper border of the pubic bone, just internal to the tuberculum pubicum, and large enough to admit one finger. The index finger is then introduced posterior to the pubic bone, and the soft parts separated from it, to and around its lower border. Then a metal carrier with a suitable curve, and long enough to reach around the pubic bone, is passed along the finger as a guide, and brought out below, at a point just external to the labium majus, the direction of the carrier being in a vertical plane. The Gigli saw is then attached to the carrier and drawn through the incision, and the bone sawed from behind forward. Upon separation of the bone, the ends spring apart, as a rule, causing a considerable enlargement of the pelvis. The subsequent delivery is completed by means of forceps or podalic version, according to the individual case. The chief obstacle encountered during the operation is hemorrhage, which, although at times somewhat profuse immediately after the sawing, is readily controlled by pressure, such as packing the wound with a strip of gauze. The small incisions may be closed with one stitch. The after-treatment consists in keeping the patient as quiet as possible, with slight support for the pelvis, such as a sand-bag at either side, or a binder. Some men, notably Van de Velde, use no support whatever, thus favoring a slight separation of the bones, which will bring about a permanent enlargement of the pelvis. The patient is allowed to be up in three weeks, at which time there is, as a rule, firm union of the bony surfaces. The operation as performed by Döderlein has been modified to a certain extent by other men, some of whom pass the carrier from below upward. But the advantage of this can scarcely be seen, as it will be much more difficult to avoid the bladder. Bumm performs the operation with a sharp-pointed carrier, which he passes through the skin and around the bone without making an incision, and without using the finger as a guide, thus making the operation a strictly subcutaneous one, but also at the same time increasing the danger of injuring the soft parts.

Since the object of pubiotomy is to avoid the injuries to the soft parts, which have so often accompanied the symphysiotomy, it will be well to consider the anatomical relations of the structures connected with and in relation to the pubic bone, especially those which are in danger during the operation, and the subsequent separation of the bones. Of these we must mention first the obturator foramen. The position of this foramen, while varying somewhat with the breadth of the pubic bone according to the age and size of the individual, never extends internal to a sagittal line through the tuberculum pubicum, so that if the bone be sawed at or slightly internal to this point, the obturator foramen will not be entered. The cut will also be separated from the large iliac vessels by the entire width of Gimbernat's ligament, so that these run no risk of being injured. The inguinal ring slightly overlaps the tuberculum pubicum with its innermost part, but does not extend internal to it. The pubovesical ligaments, which attach the bladder to the pubic bone, extend from the base of the bladder near the external orifice of the urethra to the inner surface of the body of the os pubis, where they are attached partly to the periosteum and partly to the anterior medial portion of the arcus tendineus. The attachment is entirely internal to the tuberculum pubicum, so that these ligaments escape when the bone is sawed at this point, and the bladder is held undisturbed in its position, attached to the medial fragment, a very important advantage over the condition after symphysiotomy. The bladder itself is separated from the os pubis merely by fat; it lies closer to the bone during pregnancy than normally, but is easily loosened from it.

The vagina is not in direct relation to the field of operation, and would not be injured if the carrier be held close to the bone. As a precaution, however, one finger in the vagina may be used as a guide.

The venous plexuses lying in close relation

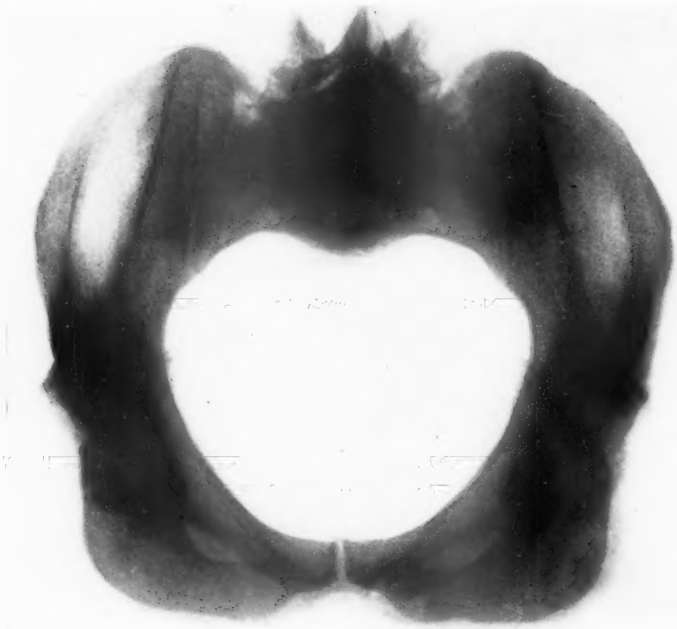

Fig. 1.

to the bladder, vagina, and uterus are also undisturbed.

Running along the lower border of the body and ramus of the os pubis, and very closely attached to the periosteum, is the crus of the corpus cavernosum clitoridis. The line of separation of the bone would strike this toward its outer third, so that it would almost certainly be cut. To be sure, this, together with the periosteum, to which it is intimately attached, may be separated from the bone and the carrier passed between them, but during the subsequent sawing the corpus cavernosum would undoubtedly be cut, especially in the subcutaneous method. Tandler has suggested making a larger incision over the corpus cavernosum, and cutting it after previously tying off, but the disadvantage of the larger incision is greater than that of the bleeding, which is easily checked by pressure. This is, in most cases, the only important source of hemorrhage, for there is very little bleeding from the ends of the bones, and this is chiefly from the lateral portion, since the median fragment has merely a collateral circulation from the obturator and epigastric arteries. The crura are covered by the musculus ischiocavernosus. The arteria clitoridis crosses the field of operation as it runs parallel to the perpendicular ramus, but is of little consequence. The bulbus vestibularis, which extends downward from the clitoris behind the labium minus, may be injured if the carrier be passed too far inward, and may thus form a source of hemorrhage, but if care be taken in passing the carrier, this should escape injury.

The periosteum is much thickened along the upper border of the bone, corresponding to the insertion of Poupart's ligament and the ligamentum pubicum. It is also thickened on the lower border, where the ligamentum arcuatum is attached, and is thick and fibrous along the attachment of the corpus cavernosum. It contains a series of arteries which come off from the obturator artery on the anterior surface of the pelvis.

The muscles attached to the pubic bone which must be considered are as follows: Internal to the tuberculum pubicum, and hence to the saw-cut, and attached to the upper border of the bone, is the rectus abdominis with the pyramidalis. Directly under this, on the anterior surface of the bone, is the adductor longus, and laterally from it the adductor brevis. Next to the free medial edge of the pubic bone, and reaching over the ramus, is the gracilis. After the separation of the bones, the greater part of the adductor longus and gracilis, and a small part of the adductor brevis, remain with the part of the bone attached to the symphysis, and the remaining portions of these muscles to the lateral fragment. They thus tend to draw the bones together after the operation. The rectus abdominis will remain attached to the body of the os pubis, and thus the support of the abdominal wall will be well preserved.

The transversus perinæi profundus reaches on the pubic bone to its union with the ischium, and internally surrounds the urethra and vagina. After the operation, the portion attached to the medial piece of bone will remain intact, while the part on the lateral fragment, which also surrounds the posterior vaginal wall, will be stretched, and possibly torn, if the bones are too widely separated.

The levator ani springing from the inner surface of the body and ramus of the os pubis reaches inward almost to the symphysis. On separation of the bones, it will be separated so that the part attached near the symphysis and bordering on the hiatus genitalis will remain on the medial fragment and the rest on the lateral fragment.

Since the musculus transversus perinæi profundus and the levator ani are very important for the support of the uterus, the separation of their fibers may be considered one of the principal dangers of the operation, but the clinical reports show no tendency to prolapse of the uterus after pubiotomy.

To determine the changes which take place in the various diameters of the pelvis after the operation, and to find the exact amount of room to be gained by it, experiments have been performed by various men, and measurements of the pelvis taken before and after separation of the bones. But these experiments

Fig. 2.

have for the most part been done in a way which does not correspond to the mode of enlargement of the pelvis by the extraction of the fœtal head, and hence they have little value in showing the extent and the limitations of usefulness of the operation. Thus Tandler and others have separated the ends of the bones by means of blocks of various widths, and have compared the internal measurements after varying degrees of separation.

In the experiments which are reported in this paper, the attempt was made to apply a force from within which would imitate as nearly as possible that produced by the head itself. To accomplish this, a divulsive force was applied in the true conjugate diameter by means of a turn-buckle to the extremity of which was attached a block of wood curved to correspond to the shape of the child's head. Then, after sawing the bone in the usual way, the conjugate diameter was increased ½ cm., 1 cm., and 2 cm., and measurements of the other diameters, as well as the amount of separation of the bones taken for each degree of increase. This was done on the bony pelvis with simply the ligaments attached, on the dissected pelvis with the soft parts in place, and also on the fresh cadaver in the autopsy-room. In this way the effect of the operation upon the sacroiliac ligaments and upon the soft parts connected with the pelvis was studied. The results of the measurements were as follows. The bone was cut on the left side of the symphysis.

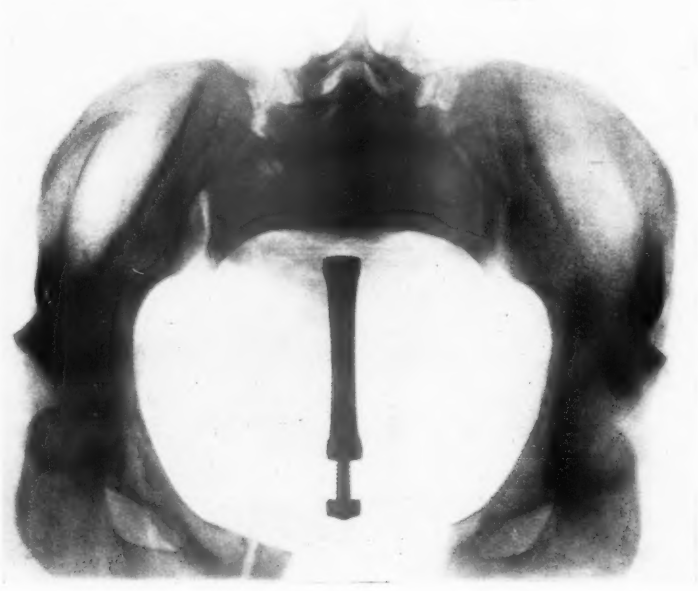

Fig. 3.

| | | | | Max. Possible |
|---|---|---|---|---|
| Increase in true conjugate..... | 1 cm. | 1.5 cm. | 2 cm. | 2.25 cm. |
| Increase in transverse diameter . | 0.5 cm. | 1.00 cm. | 2.50 cm. | 3.25 cm. |
| Increase in right oblique diameter | 0.5 cm. | 0.75 cm. | 1 cm. | 1.5 cm. |
| Increase in left oblique diameter. | 0.75 cm. | 1.25 cm. | 2 cm. | 2.5 cm. |
| Separation of the bony surfaces.. | 2.25 cm. | 4 cm. | 6 cm. | 7 cm. |

It will be seen from these measurements, and from the accompanying X-ray photographs, that the enlargement, although not a purely symmetrical one, is by no means so one-sided as some writers would have us believe. The greatest variation was in the

oblique diameters, the left oblique being increased noticeably more than the right oblique when the incision was made on the left side; or in other words, more room was gained on the side opposite the cut than on the same side. This is directly the opposite of the findings of Tandler, who merely separated the ends of the bone and found that the increase was almost entirely on the side on which the cut was made. The method of increasing the conjugate described here corresponds very accurately to that actually occurring in cases of flat pelvis. It will be noticed that the first centimeter increase is obtained with relatively little separation of the bones, but after this the increase in the conjugate is proportional to the separation of the bones.

The amount of separation of the bones in the sacroiliac joints is best shown by the accompanying X-ray photographs. Fig. 1 shows the pelvic inlet before pubiotomy; Fig. 2 shows the same pelvis after an increase of 2 cm. in the true conjugate diameter; and Fig. 3 shows it after a maximum increase in size. In the latter the conjugate diameter was lengthened 2.25 cm. It will be seen that there is a separation of the bones in both sacroiliac joints, and that although this is slightly more marked on the side opposite the pubiotomy, it is fairly evenly divided between the two joints. The anterior ligaments of these joints were made tense and elevated from the bone along with the periosteum for about 1 to 1.5 cm. from the joint. The ligaments were not torn in the least. Cauvenberghe found that after a 6-cm. separation of the bones there were often lacerations in these ligaments, although some pelves even allow of an 8-cm. separation without a tear in the ligaments.

Krömer, after comparing the enlargement of the pelvis after pubiotomy and symphysiotomy, claims that there is the same degree of enlargement in the former as in the latter. Sellheim came to the same conclusion, after careful experiments. He also estimated the force necessary to bring about the enlargement with a dynameter, and found that three times as much force was required after pubiotomy as after symphysiotomy.

As to the limit of usefulness of the operation, that is, the lowest grade of contraction in which it may be performed with safety, there has been some controversy.

To fix a definite limit in centimeters, as some men have done, is of course impracticable, since so much depends upon the size of the child's head; that is, the relation between it and the pelvis. Therefore before deciding for or against the operation in a given case, it is well to determine as accurately as possible the size of the child's head. This may be done most accurately by measuring the occipitofrontal diameter through the abdominal wall with an ordinary pelvimeter, and from this measurement computing the biparietal diameter. One must then make allowance for the compressibility of the head, which, to be sure, is another uncertain quantity, the estimation of which depends to a large degree upon the judgment of the operator; but in the average case one may safely allow ½ cm. for this compression. Having thus determined the degree to which the biparietal diameter of the head may be diminished, we may say that the smallest true conjugate through which this could be delivered with safety would be 2 cm. less. Thus if the biparietal diameter measured 9 cm., the limit of pelvic contraction would be 6.5 cm. in a flat pelvis, or somewhat more in a generally contracted pelvis.

This allows of a 4 to 5 cm. separation of the bones of the pelvis. Döderlein has separated the ends of the bones 5 cm. without any injury to the soft parts, although so great a separation is rarely necessary.

The pelvis with the shortest conjugate diameter in which pubiotomy has been done successfully was that in a case reported by Seeligmann. The diagonal conjugate was 8 cm., from which the true conjugate was estimated at 6 to 6¼ cm. The child weighed 3,500 grams, and the circumference of the head was 35 cm. This was a flat, rachitic pelvis, with plenty of room on the sides. In not a few cases with a conjugate of 6.5 cm. has the operation been done with good results, while in the majority of the cases the conjugate diameter has been between 7 and 7½ cm. In cases with generally contracted pelves the limit of contraction of the conjugate should be about ½ cm. greater than in flat pelves, although in these so much depends upon the degree of

contraction of the other diameters that estimates must be made in a similar way for each individual case.

The results of the operation have been as follows: In May, 1905, Gigli was able to collect in the literature 93 cases of pubiotomy, with 4 deaths. Kannegiesser has recently collected additional cases enough to make 146, and since then I have found 11 cases, making a total of 157 cases in which the operation has been performed, with 8 deaths. In this list there are no cases of American obstetricians. The fatal cases were as follows:

Two were the cases of Baumm already mentioned, in both of which the patients died of sepsis, the infection having been present before the operation. Three more cases — those of Lauderini, Toporski, and Werth — were very similar, and the infection was thought to have been present before the operation. This was especially true of Werth's case. A sixth case was that of Hart, in Edinburgh, in which the patient died from chloroform. The seventh was a case of Saladino, in which the patient died of typhoid fever 25 days after the operation. The eighth case was that of Busse, in which the patient died four days after the operation; the autopsy in this case showing thrombosis of both ovarian veins extending as far as the renal veins.

If the history of previous infection be relied upon in the five cases in which there was sepsis, there remains but one case in which death may be said to have resulted from the operation, namely, the one in which there was thrombosis.

The most remarkable case was a recent one of Henkel's, in which there was a central placenta prævia, as well as a contracted pelvis. In this case, hebotomy was done, and then the child was delivered by means of a vaginal Cæsarean section.

I have been unable to find a single case where the bony surfaces did not unite after the operation. The poorest results in this respect were cases in which there was fibrous union of the bones, in one of which there was slight mobility. This, however, in no way affected the gait of the patient, or her ability to perform her work, which was that of a washerwoman.

A most interesting result has been observed by several men; namely, a permanent enlargement of the pelvis. This must, of course, be very slight, there being usually not more than 1 cm. separation between the bones, and this would cause comparatively little increase in any of the internal diameters. Von de Velde and Kannegiesser have reported cases in which pubiotomy had been done, and at a subsequent labor there was spontaneous delivery, which they attributed in part to the permanent enlargement of the pelvis.

Sellheim tested the mode of healing and the permanent enlargement in animals, and found that after six weeks there was a space of 1 cm. between the bones. This was filled in with connective tissue, while on its anterior surface there was an unusually strong mass of newly formed callus. The union was firm. Kannegiesser was able to demonstrate bony union after a long period by means of X-ray photographs.

In the early operations in which the bones were wired there was bony union from the first, with no enlargement of the pelvis.

Complications, although nothing like those seen after symphysiotomy, do occur, and cause temporary annoyance, although the ultimate results have been perfect. The principal complications are the following:

1. Hæmatomata of the labia and at the site of the operation. These have been fairly large in a few cases, but have subsided rapidly.

2. Lacerations in the vaginal wall, which in a few cases connected with the field of operation.

3. Injury to the bladder has been reported. The last two complications may be attributed to too brisk separation of the bones, and too rapid delivery.

4. Thrombosis of the veins of the leg. While the ultimate results have been excellent, these injuries to the soft parts are not mere trifles, and simply show that the operation is not such a simple one as it would appear, and that care must be used in performing it.

Among the advantages of the operation over Cæsarean section may be mentioned: 1. The fact that the peritoneal cavity is not opened, and that the field of operation does not connect with the generative tract, allows of its being done in cases in which there is infection already present, or there is a suspicion of

infection on account of examinations under doubtful asepsis. 2. The greater simplicity allows of its being done in a private home; and the fact that it may be done practically subcutaneously greatly lessens the danger of infection. 3. The operation includes nothing which would interfere with future labors. The uterine wall is not incised, and this eliminates the danger of weakening it.

The disadvantages have already been mentioned. They consist of complications which have occasionally, though not frequently, occurred.

Another possibility of usefulness suggests itself in those cases in which there is doubt as to the relative sizes of the head and the pelvis, cases in which, although orceps may fail, there is a possibility of delivering a living child by means of version. No doubt many babies have been lost in just such cases, in which, through a slight error in judgment, version has been done, and the aftercoming head has been held by the brim, with a resulting craniotomy. In such cases it would be an easy matter to simply pass the carrier and lay the saw in place before doing the version, and if the latter does not prove successful, quickly saw through the bone and extract the head. The speed with which the bone may be sawed makes this easily possible. If the version proved successful without the pubiotomy, the slight incision for passing the saw would be of no consequence.

Thus the most important use of hebotomy is in those cases which have heretofore furnished relative indications for Cæsarean section. The operation need not supplant the induction of premature labor for contracted pelvis, but the combination of the two methods may be made with advantage, so that on the one hand a too great separation of the bony fragments would be avoided by the delivery of a smaller child, and on the other hand a too early induction, with its consequent detriment to the chances of the child, would be avoided. This combination of induction and hebotomy was suggested by Pfannensteil, and cases have been reported by Reeb, Stöckel, and Dührssen.

The suggestion recently made by Döderlein to perform the hebotomy and then await a spontaneous birth seems entirely unjustifiable when one considers the best interest of the mother, and if this were done the labor should certainly be made painless; for example, by spinal anæsthesia. Still, immediate delivery after hebotomy should be advocated.

In regard to the question whether labor should be completed by forceps or by version, it should be mentioned that in case version is done after hebotomy there may be difficulty in rotating the shoulders to free the arms.

The results for the child have not been so uniformly good as for the mother. In Kannegiesser's series of 23 cases performed in Leopold's clinic in Dresden, 19 children lived. Of the 4 dead babies, 1 died two days after the delivery, from an injury which had no relation to the operation. In a second case there was a difficult face-presentation, and as the child died during the operation, craniotomy was done. The other two still-births were possibly the result of pressure; forceps were used for each.

In conclusion, we may say that the addition of hebotomy to the resources of the obstetrician is a decided advance, and that its judicious though not too enthusiastic adoption in this country, with a careful consideration of the indications in each case, would give gratifying results. Its use is, above all, destined to stamp as a thing of the past craniotomy upon the living child.

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# PULMONARY COMPLICATIONS FOLLOWING ABDOMINAL OPERATIONS

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IN order to obtain some idea of the frequency with which an inflammatory condition of the lungs may follow abdominal operations, we have made an analysis of 1007 consecutive abdominal sections that have come under our observation during the past seven years. Formerly, and to some extent to-day, one hears the term "ether pneumonia" employed in explanation of the fatal result that has followed an abdominal operation. That a pneumonia may result indirectly from the irritating effects of this drug, there can be no question, but recent observations at the autopsy-table go to prove that in the great majority of these cases the pulmonary complication has been due to the extension of a septic process which has originated from the field of the operation. This term undoubtedly, therefore, like heart failure, shock, uræmia, obstruction of the bowels, etc., is often employed incorrectly.

We will here consider quite briefly some of the factors which are undoubtedly concerned in producing these lung complications, and offer certain suggestions that experience would seem to teach are of value in preventing the occurrence of such sequelæ.

*The Anæsthetizer.*[1] There is a considerable difference at times in the methods employed in the giving of an anæsthetic. The better the anæsthetizer the less will be the amount of ether used. Until a physician has had an abundant experience in this work, the patients are more likely to develop some lung involvement. In a hospital service it is a difficult matter to allot this duty to one man for more than from four to six months. To some extent it is possible to overcome this drawback by training each new man by first allowing him merely to assist with the giving of the anæsthetic, to a dozen or more patients, and until he becomes more proficient, the operator should keep under his observation the administration of the anæsthetic. Particular care should always be taken not to allow the patient to inspire any vomited material.

*The Anæsthetic.* The method now commonly employed of producing a primary narcosis by the use of nitrous oxide gas, and then following it with ether, has proved very satisfactory in the great majority of cases. Moreover, the ether must be free from any impurities, as it has been shown that an adulterated brand has frequently caused an inflammatory involvement of the respiratory organs. If the patient secretes a considerable amount of mucus from the posterior nares and the mouth during the administration of the anæsthetic, this inconvenience can frequently be overcome by a hypodermic injection of atropine sulphate 0.75 grain.

*The Duration of the Anæsthesia.* As a general rule, it may be said that the quicker the operation is performed, the less will be the amount of shock experienced by the patient. On the other hand, carefulness and thoroughness in our manipulations should never be sacrificed to speed. It will very often happen that much better work can be carried out by keeping the patient under the anæsthetic for an additional ten minutes or more, and it is in

[1] Eight of the 35 cases that presented complications following the anæsthetic occurred in the early experience of the anæsthetists. There were 7 cases in the fourth, 6 in the fifth, 5 in the sixth, 4 in the third, and 5 in the second month's experience. The total number of anæsthetists was 16, or 61¼ patients to each anæsthetist. The greatest number developing complications for one anæsthetist (six months' service) was 6 cases, and for another, 5 cases.

the exceptional case only that this increased length of time will be productive of any harm.

*The General Condition of the Patient.* Frequently, patients are operated upon without having been subjected to a careful physical examination. It is a better routine (unless the operation is for an emergency) to keep the patient under observation for two to four days, at least, before she undergoes a serious operation. By observing such a routine, any abnormality of the lungs or other organs that may be present can hardly fail to be detected. During this time of observation, every possible means should be carried out to bring the patient into as good a general condition as possible, in order that she may go through the shock of the operation.

*The Temperature of the Operating-room.* The temperature of the operating-room should not be below 80° F. During the winter months it is better to maintain the temperature of the room at 85° F. or 90° F. If the operating-room is sufficiently warm, the operator can wear light-weight underclothing and the ordinary operating-room suit with comfort. Under such circumstances, if the patient is properly protected, the room will usually be warm enough. If the ordinary hot-water, hot-air, or steam-heating appliances do not produce a sufficient degree of warmth in the room, a gas-stove should be in readiness for temporarily heating the room.

*The Care of the Patient during and Immediately Following the Operation.* During the winter, spring, and autumn months, before the patient is taken from the ward to the operating-room, the entire chest should be enveloped with a "pneumonia-jacket." As soon as the patient is anæsthetized and placed upon the operating-table, a blanket is placed over the portion of the jacket that covers the anterior chest-wall. The hips and thighs are also enveloped in a blanket. The buttocks and trunk rest upon thick pieces of muslin, which are in contact with the glass top of the table. As soon as the abdomen has been cleansed, a thickly padded compress is placed under the back and the hips. By carrying out this detail we have never found it necessary to employ the hot-water pads that are used by some operators. The usual protecting towels and sheet are now placed in position.

The abdominal viscera should be exposed and handled as little as possible, and in order to prevent this taking place, as soon as the abdomen is opened we place a good-sized dry gauze sponge, or one wrung out of hot saline solution, against the intestines in the upper abdominal zone. This sponge also prevents the intestines from coming in contact with the field of operation. Just as soon as the operative procedures are finished, we irrigate the pelvis with one or two liters of a normal solution, at a temperature of 112° F. After sponging out this fluid, we introduce from 500 to 1,000 c.c. of a warm normal saline solution into the abdominal cavity, and allow it to remain there. After the abdomen is closed and the dressings have been applied, the patient is given a stimulating enema, consisting of a pint of a warm salt solution, with two ounces of brandy, twenty grains of the carbonate of ammonium, and one twentieth of a grain of the sulphate of strychnine. If the "pneumonia-jacket" becomes soiled or wet during the operation, the chest is wiped dry, and another jacket is put on before the patient is taken from the operating-room. The use of the jacket and the stimulating enema we consider of great value as prophylactic, in preventing the development of shock and pneumonia following an abdominal operation, since, in spite of all possible precautions, the patient is sometimes subjected to a considerable amount of exposure immediately following the operation, before she is placed in her bed. Again, the jacket is of value if the patient should become exposed to a draught while unconscious, and especially during the night-time, when she cannot, as a rule, be so well taken care of. It is also important, during the continuation of the anæsthesia, to guard against the inspiration of any vomited material, which would be apt to produce an "inspiration pneumonia." To prevent this, the patient should be constantly looked after, and all such material should be carefully removed from the mouth.

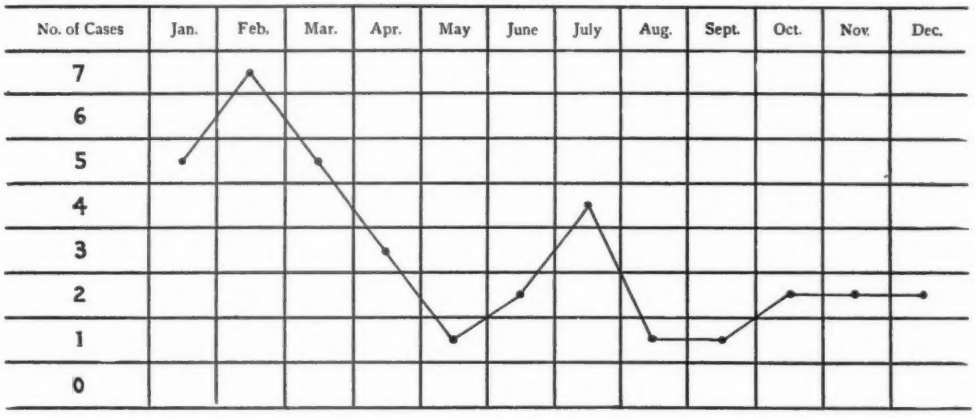
### ANALYSIS OF CASES

In 1007 abdominal operations 35 (3.5 per cent) of the patient, developed a post-operative

inflammatory lesion of the respiratory tract (bronchitis, pneumonia, etc.). There were 3 cases in 1898, 7 in 1899, 10 in 1900, none in 1901, 2 in 1902, 4 in 1903, 5 in 1904, 3 in 1905, and 1 in 1906 (to June 20th).

*The Months of Greatest Frequency.* As one would naturally expect, the greatest number of cases occurred during the winter months, as shown by the accompanying chart. It will also be seen that during the month of July there is an elevation of this percentage column. This fact may be explained by the occurrence of the damp days so common during the early part of this month. It is possible, also, that the patients are not so well protected against

(CHART)




the exposure to draughts, etc., as they are in the colder months.

*Age.* The oldest patient was 49 years old; the youngest, 17. The average age was 32. In this particular series the aged did not show a greater susceptibility to lung complications than did the young. The greatest frequency took place in the third decade, 14 cases being recorded. This incidence may have been influenced by the fact that the greatest number of operations took place in this decade, and also that most of the operations were possibly of a serious nature.

*Physical Condition.* In 31 cases the examination of the chest gave negative results prior to the taking of the anæsthetic. In one patient, who had a cough, but in whom the physical signs in the chest were negative, following the operation, a diffuse bronchitis developed. In another patient with a narrow, phthisical chest, the physical signs were negative. Following the operation, râles could be made out over the entire chest, and tubercle bacilli were also present in the sputum. In a third patient, numerous crackling râles were heard in the axillæ, and over the right lung the percussion note was of a higher tone than normal. An exploratory cœliotomy was performed for cancer of both of the ovaries, with extensive abdominal metastases. The patient did well until the fifth day, when a bronchopneumonia developed, and later proved fatal. In a fourth patient there was some slight impairment of the percussion note over the greater portion of the right chest; the breath-sounds were roughened, and there was an increased tactile fremitus. No râles could be detected. Following the operation, an acute pneumonia developed, which slowly disappeared. This was thought to be due to a tuberculosis, but no tubercle bacilli were found in the sputum, even after repeated examinations.

In a few instances certain unimportant physical signs were made out, which remained unchanged after the operation. These cases, however, are not included in this series.

*Personal and Family History.* In five instances there was a history of a tuberculosis

in the family. In five there had been some previous inflammation of the lungs. One patient was addicted to the cigarette habit.

*Anæsthetics.* Squibb's sulphuric ether is the anæsthetic generally used in our clinic. It is usually preceded by the nitrous oxide gas. The average amount of ether used was 372 grams; the greatest quantity in any one case, 700 grams; the smallest quantity, 200 grams.

*Length of Time of Anæsthesia.* The average length (from the beginning of the time of starting the anæsthetic) of the anæsthesia was 1 hour and 52 minutes; the longest period, 3 hours and 25 minutes; the shortest time, 40 minutes.

*Duration of the Operation.* The average duration of the operation was 1 hour and 32 minutes; the longest period, 3 hours and 25 minutes; the shortest, 20 minutes.

DIAGNOSES

In this series (of 35 cases) the following conditions were met with:

| | |
|---|---|
| Vulvovaginitis | 1 |
| Relaxed vaginal outlet | 5 |
| Endometritis | 10 |
| Retrodisplacements of the uterus | 11 |
| Myoma uteri | 2 |
| Sarcoma uteri | 1 |
| Follicular hypertrophy of ovary | 9 |
| Flexure of appendix | 3 |
| Concretions in appendix | 1 |
| Perityphlitis | 1 |
| Chronic appendicitis | 1 |
| Tubo-ovarian abscess | 3 |
| Carcinoma of ovary with metastases | 1 |
| Fibroma of ovary | 1 |
| Salpingo-oöphoritis | 16 |
| Hydrosalpinx | 3 |
| Hæmatosalpinx | 1 |
| Tubal pregnancy | 1 |
| Appendix, Abscess of | 1 |
| Pelvic peritonitis, Chronic | 7 |
| Ventral hernia | 1 |

*Pus.* In 8 instances (23 per cent) pus was encountered in the pelvis. In two additional cases an acute purulent peritonitis developed after the operation. In these two instances, a pleurisy with an effusion developed. From one, streptococcus pyogenes was isolated from the fluid from each pleural cavity, and also from the peritoneal cavity. In the second case, staphylococcus pyogenes aureus was found in the fluid from the peritoneal cavity. In all, therefore, in 10, or about 29 per cent, of the cases, pus was present in the pelvis. In the eight original pus cases we were able to demonstrate micro-organisms only once, namely, in a tubo-ovarian abscess, as the result of a streptococcus infection.

OPERATIONS

In 15 cases the operation consisted of both a vaginal and an abdominal procedure. In three cases drainage through the cul-de-sac was carried out.

The following operations were performed:

| | |
|---|---|
| Dilatation and curettage | 12 |
| Anterior colporrhaphy | 1 |
| Perineorrhaphy | 3 |
| Vaginal puncture | 3 |
| Herniotomy (ventral) | 1 |
| Exploratory cœliotomy (inoperable carcinoma) | 1 |
| Suspension of uterus[1] | 12 |
| Myomectomy | 1 |
| Supravaginal hysteromyomectomy | 3 |
| Separation of adhesions | 5 |
| Bilateral salpingectomy | 2 |
| Unilateral salpingectomy | 1 |
| Ignipuncture of the ovary | 3 |
| Bilateral salpingectomy with unilateral oöphorectomy | 6 |
| Unilateral salpingo-oöphorectomy | 4 |
| Bilateral salpingo-oöphorectomy | 14 |
| Appendicectomy | 17 |
| Total number of operations | 92 |
| Number of cases upon whom a single operation was performed | 1 |
| Number of multiple operations | 34 |

PERIOD OF TIME ELAPSING AFTER OPERATION BEFORE APPEARANCE OF LUNG INVOLVEMENT

| | *No. of Cases* |
|---|---|
| Immediately after operation | 9 |
| Second day after operation | 12 |
| Third day after operation | 4 |
| Fourth day after operation | 2 |
| Fifth day after operation | 2 |

[1] In two of the twelve cases, a suspension operation alone was performed. In the remaining cases, other procedures were carried out at the same time.

Sixth day after operation ..... 1
Seventh day after operation ..... 1
Sixteenth day after operation ..... 1
Seventeenth day after operation ..... 1
Twenty-first day after operation ..... 1

*Duration of the Lung Lesion.* In three instances the lung complication was terminal in character, and was present for 2, 10, and 36 hours respectively before death ensued. In three cases there were evidences of physical signs in the lungs when the patient left the hospital; one on the thirty-first, another on the seventy-sixth, and a third on the seventy-eighth day following the operation. In the first instance the signs were due to a pulmonary tuberculosis; in the second, to metastases in the lungs from a sarcomatous uterus; in the third, to a thickened pleura. This last patient was operated upon six months later for an empyæma of the right pleural cavity. In the remaining instances the lesions disappeared at the end of the following periods:

| | |
|---|---|
| 3 days in 4 cases. | 10 days in 2 cases. |
| 5 days in 1 case. | 14 days in 3 cases. |
| 6 days in 2 cases. | 19 days in 1 cases. |
| 7 days in 6 cases. | 20 days in 1 case. |

The following were the symptoms of the lung complication, arranged according to their frequency:

Cough in .....20
Dyspnœa .....11
Pain in chest .....10
Fever in ..... 6
Cheyne-Stokes respiration in ..... 1
Bloody expectoration in..... 1
Chills in ..... 1
Cyanosis in ..... 4
Sharp pain in breathing in ..... 2
Rapid or failing pulse in ..... 2
Restlessness in ..... 1
Aphonia in ..... 1

LUNG DIAGNOSIS

*Bronchitis.* Of the 35 cases, 18 were due to a bronchitis, 5 being of a very mild nature. One was possibly tuberculous in origin, as there were râles over a localized area in either lung, with a bloody expectoration, although no tubercle bacilli were demonstrable in the sputum. The physical signs present were coarse, moist râles throughout both lungs.

In some of the milder cases, râles were demonstrable only over the bases of the lungs. These patients recovered completely in from 3 to 20 days following the onset of the bronchitis. In one instance there developed a bronchitis following a suspension of the uterus, and a bronchopneumonia occurred three years later, after the removal of an ovarian cyst.

*Pleurisy* occurred in 9 patients. In 4 cases there was a friction rub with a few râles, but there were no evidences of any fluid in the pleural cavity. In two additional cases fluid could be made out in the pleural cavity. In one of these cases the fluid gradually became absorbed. We believe that the pleurisy in both instances was secondary to the peritoneal infection. All of the above instances of pleurisy recovered

There were three additional instances of pleurisy, which proved fatal. In one there was an effusion with a sarcomatous involvement of the lungs, which was secondary to a similar condition in the uterus. The involvement of the pleural cavity developed immediately after the abdominal operation, and lasted for 77 days. The metastatic involvement in the lungs was proven by autopsy. In the remaining (two) fatal cases the pleurisy was a terminal infection. In one instance pus was found in both pleural cavities, and in the other the exudate was of a serofibrinous character.

*Acute pulmonary tuberculosis* developed in three instances immediately after operation. In two, tubercle bacilli were demonstrated in the sputum after the operation. Before the operation the examination of the chest had given negative results.

In a third case the physical signs in the right lung were suggestive of a tuberculous involvement. After the operation an acute tuberculous pneumonia developed, although we were unable to demonstrate any tubercle bacilli in the sputum. These patients had improved when they were discharged from the hospital.

*Bronchopneumonia* occurred in 3 patients, who recovered, and in 2 in whom the condition proved to be a terminal infection. A sixth case also proved fatal from cardiac dilatation.

*Convalescence.* In 18 cases the recovery from the lung complication took place speedily;

in 2 it was prolonged. In 2 instances there was a severe laryngitis. In 1 there was persistent vomiting for several days. In 1 there was a left femoral phlebitis. In 2 there was a septic peritonitis, in 1 of which there was an abscess of the chest-wall.

*Mortality and Analysis of Fatal Cases.* There were 5 deaths, or a mortality of 14 per cent for the cases that developed lung complications. Three deaths were from a bronchopneumonia, one from a serohemorrhagic fibrinous pleurisy, together with a streptococcus peritonitis, and one from a pleural effusion, from a malignant disease, which lasted for 77 days after the operation.

ANALYSIS OF FATAL CASES

CASE 1. (Gyn. No. 271.) Exploratory cœliotomy for carcinoma of both ovaries. The growths could not be removed. The patient's condition was satisfactory until the fifth day after the operation, when a *bronchopneumonia* developed, from which she died 36 hours later. The autopsy showed an adenocarcinoma of both ovaries with metastases in the pelvis. There were also present a chronic parenchymatous nephritis and a *bronchopneumonia*.

CASE 2. (Gyn. No. 378.) The patient was operated upon for a right tubo-ovarian abscess. She died on the evening of the fifth day, of a pelvic peritonitis. During the last ten hours of life, the lungs began to fill with mucus. At the autopsy the following findings were recorded: Pelvic abscess, fibrinopurulent peritonitis, serohemorrhagic-fibrinous pleurisy, serous pericarditis, congestion and atelectasis of lungs. Streptococcus pyogenes was found in the lungs and liver, and in the pleural and peritoneal cavities.

CASE 3. (Gyn. No. 415.) The patient was operated upon for a left tuboovarian abscess, from which streptococcus pyogenes was isolated. On the second day after the operation a peritonitis developed; the abdomen was reopened, and drainage was established. On the morning of the third day, the bronchi filled with mucus, and two hours afterward the patient died. Post-mortem examination revealed the following conditions: Pelvic abscess, seropurulent peritonitis and pleurisy, serous pericarditis, bronchopneumonia, necrosis of intestinal mucosa.

CASE 4. (Gyn. No. 636.) A panhysterectomy was performed for a sarcoma of the uterus. On the following day a pleural effusion took place. The patient gradually sank, and on the seventy-sixth day left the hospital against advice. She died at home on the following day. At the autopsy, metastatic nodules were found throughout the lung tissue and pleural cavities.

CASE 5. (Gyn. No. 2241.) Hysteromyosalpingo-oöphorectomy was performed. Patient had very thick abdominal walls. Operation lasted 3 hours and 35 minutes, 700 grams of ether being used. On third day, bronchopneumonia developed; no peritoneal or bowel symptoms. Died on fifth day, from an acute cardiac dilatation.

CONCLUSIONS

Pulmonary complications after abdominal operations may originate in several ways.

1. Generally from an infection originating from the field of operation.

2. From the effects of the anæsthetic:

(*a*) From the administration of too great a quantity of the drug, exhibited over too long a time;

(*b*) From the inspiration of vomited or infective material — inspiration pneumonia;

(*c*) From injurious substances contained in an adulterated anæsthetic.

3. Exposure, either during or after the operation, to sudden or excessive changes of temperature.

4. In 1007 abdominal operations, 35 or (3.5 per cent) of our patients developed pulmonary complications.

5. Older patients do not show more susceptibility to lung complications than the younger ones.

6. Only 4 of the 35 patients showed physical signs of lung involvement before operation.

7. In three cases, acute pulmonary tuberculosis was evident immediately after the operation.

8. Out of the 35 patients, 5 (or 14 per cent) died. In one case a bronchopneumonia, in a second a general peritonitis, and in a third an acute cardiac dilatation were the immediate causes. In the other two cases metastatic modules from malignant growths in the pelvis were found in the lungs.

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# REPORT OF CASE OF MULTIPLE GIANT-CELLED SARCOMA

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CASE 6155. Female, age 22. Tumor found in the right tibia, left femur, body of the fifth dorsal vertebra, both hands, and forearms. Operation on the right tibia. Removal of the tumor by means of a bone curette. Recovery from the operation, later spontaneous fracture of the left femur. Patient in apparently good health at present.

*Complaint.* Patient had been for several months suffering from pain in the upper portion of the right tibia and in the lumbar and dorsal vertebræ. The pain was progressive, finally becoming so severe as to cause serious disability.

*Family History.* Father living and well; mother died of tuberculosis seventeen years ago. Two brothers living and well. Father has had diabetes. Mother had syphilis.

*Personal History.* Did not have the ordinary diseases of childhood; has always been well and active; is a talented musician. She has had a chronic discharge from the right ear since childhood. No evidence of acquired syphilis.

*Present Illness.* About a year ago had aching pains in arms and legs, in the left side, and in the lower dorsal and upper lumbar region. This continued to increase until she became quite invalided. A year

Plate 1. Right foot. Focus in outer malleolus.

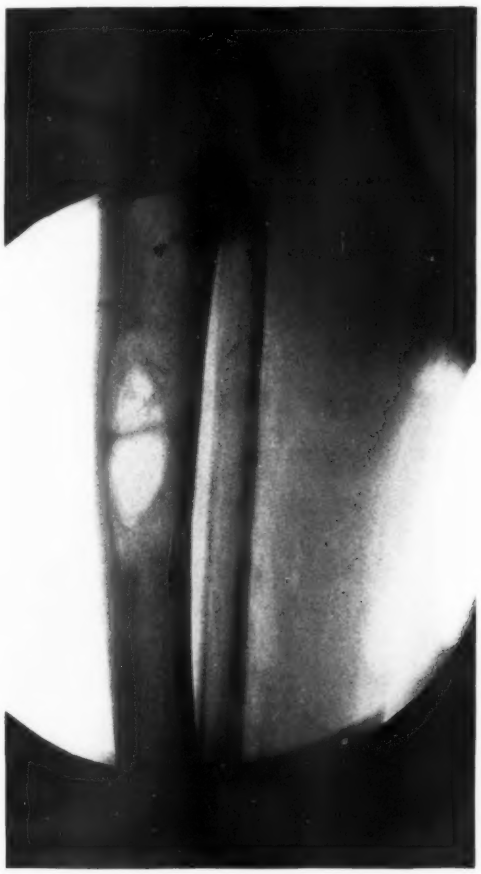


Plate 2. Right leg. Focus in middle third of tibia.

ago a lump appeared over the right tibia. Seven months ago a similar one appeared over the spine, at the level of the scapula. At the time of her entrance to the hospital, there was a swelling in the hard palate. These points were painful, but the pain was not so marked as it was in the beginning.

*Physical Examination.* Patient of medium size. Some papillary eruptions on back, and slight swelling in roof of mouth. No deformity of spine, but there is tenderness at the lower border of scapula. No general glandular enlargement. Reflexes very active. At middle crest of right tibia a slight swelling.

*Diagnosis.* X-ray examinations revealed definite tumor-like masses, the most marked one being in the upper portion of the right tibia. She had been under specific treatment, but showed no improvement. Largely as a diagnostic measure, the right tibia was opened, the tumor removed with bone curette, and submitted to Dr. W. T. Howard, Jr., for pathological examination. Sections showed areas very closely resembling giant-celled sarcoma.

*Operation.* Incision was made over the middle 1 ird of the tibia, over the tumor, and portion of the bone chiseled out. The new growth and necrotic portion of bone was then separated and lifted out in a mass. The remainder of the bone cavity was then thoroughly curetted with a bone curette, wound packed open with iodoform gauze, and moist dressings applied.

Plate 3. Right leg. Focus in outer side of head of fibula. Extensive focus of shaft of tibia.

Plate 4. Showing foci in right femur

The patient bore the operation well, but the lesion of the bone was slow in repairing. The patient was then given iodide of potassium to saturation, during which time the wound healed rapidly. The patient was given a brace to relieve her back on leaving the hospital. At the time of discharge from the hospital there was no pain, and the patient had increased in weight and general health.

Four months later there was a return of the pain in the dorsal region and a new pain in the left thigh. She was readmitted to Lakeside Hospital for further observation. The entire bony skeleton was then systematically searched with the X-rays by Dr. Hill for the discovery of any beginning lesions. As a result of that examination there were found distinct foci in the right ulna, right os magnum, the right metacarpus of the middle and index fingers, the second phalanx of the middle finger, the left trapezoid, the left metacarpus of the middle and ring fingers, the left first phalanx of ring-finger, middle third of left ulna, upper end of

Plate 5. Left thigh. Spontaneous fracture through seat of tumor.

Plate 6. Left thigh. After removal of plaster cast. Shows some attempt at union. Foci in lower third more marked than in Plates 1 and 4.

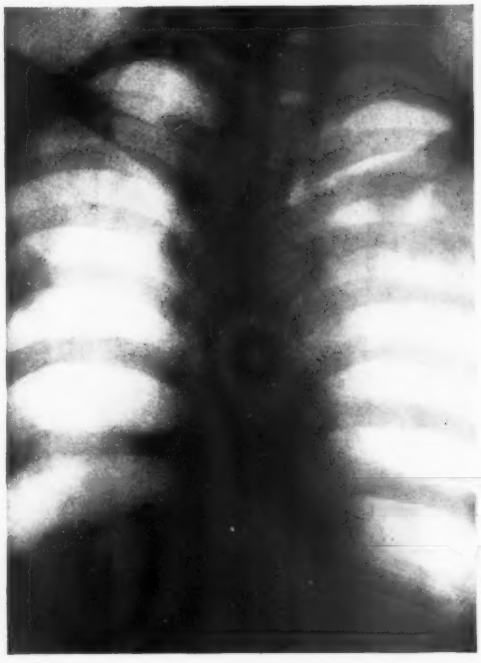


Plate 7. Spine. Fourth and fifth dorsal vertebræ involved; disease especially marked in right side of fifth dorsal. Small foci in fourth and fifth ribs, about 6 cm. from spine.

Plate 8. Right femur. Diffuse focus in the lower third. Definite small focus in middle third.

Plate 9. Left hand. Foci in trapezoid, the metacarpals of middle and ring fingers, and first phalanx of ring-finger.

Plate 10. Right hand. Foci in ulna, os magnum, metacarpals of middle and index fingers, and second phalanx of middle finger.

right ulna, many foci in the middle and lower thirds of the left femur, small focus in the right, in right upper malleolus, the right outer side of head of fibula, extensive involvement of the shaft of the right tibia, and in the right side of the fifth dorsal vertebræ. The patient has within the last month been complaining of pain in the right thigh. Previous attempts to locate foci by the X-ray have been unsuccessful, but Dr. Hill has succeeded in finding two which show in Plate 8.

These foci are characterized by their appearance in the medullary portion of the bone, usually well defined, sometimes very small, sharply circumscribed, at other times elongated, appearing either in the epiphysis or in the shaft, in the short bones more often than in the epiphysis.

Plate 11. Forearms. Small focus in middle third of left ulna. Focus in upper end of right ulna.

**WESTERN RESERVE UNIVERSITY**
**Department of Surgery**

# CLINICAL AND EXPERIMENTAL OBSERVATIONS ON SURGICAL HEMORRHAGE

By GEORGE CRILE, M. D., and D. H. DOLLEY, M. D., Cleveland, Ohio

A SERIES of experiments on sixty-one animals was made with special reference to arterial hemorrhage. In the experiments in which the animals were rapidly bled, the blood-pressure fell more evenly than in the experiments in which the animals were slowly bled. In rapid bleeding, the blood-pressure continues to fall after the cessation of the hemorrhage. In all varieties of hemorrhage there is an immediate tendency to a compensatory recovery. The extent of the recovery depends upon the individuality of the animal and amount of the hemorrhage.

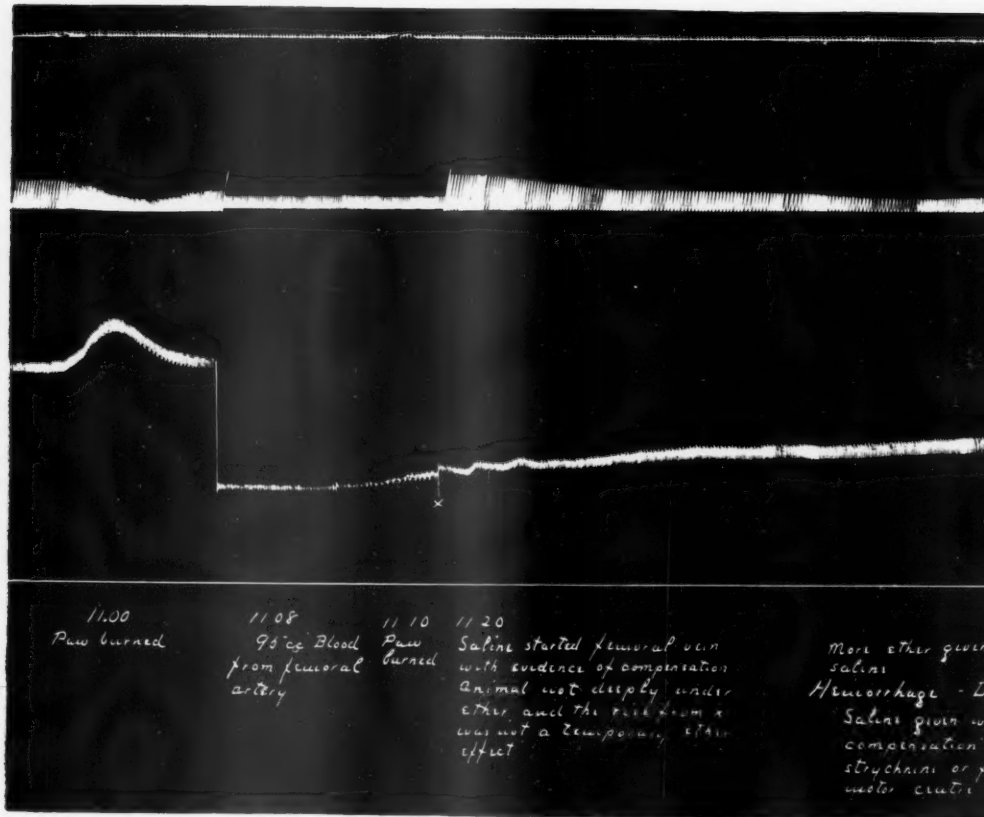
Roughly speaking, compensation is noted in all the grades of hemorrhage until such a degree has been reached that the vasomotor center is no longer actively responsive to reflex stimulation, such as burning of the paw or stimulation of the sciatic nerve. With the hemorrhage and the fall in the blood-pressure, the specific gravity of the blood falls. After the hemorrhage has proceeded until there is no effort at compensation, the animal rarely recovers unaided. If, however, the blood-pressure was raised either by saline infusion, by bandaging, or by the administration of adrenalin, sometimes the centers became more active, and the blood-pressure assumed and held a higher level.

In the experiments in which the hemorrhage was continued until there was no spontaneous compensation, and there was no response to reflex stimulation, the animal rarely could be made to recover. There was a marked difference, however, in the final result if an interval were allowed between the time of the ending of the hemorrhage and the beginning of treatment. The longer the interval of low blood-pressure without spontaneous compensation, the less marked were the effects of the stimulation of the vasomotor center, or other methods of treatment.

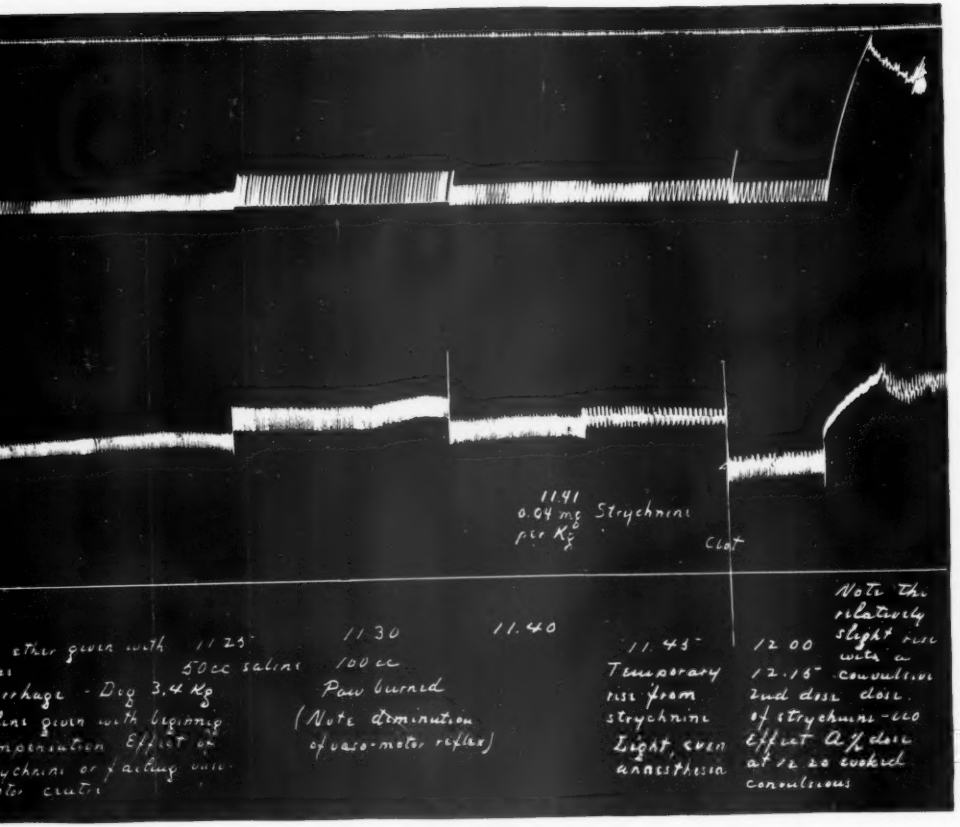
The proportion of lost blood to the body weight that animals withstood and recovered from varied considerably in individual cases. This degree of variation seemed to us to be greater than is usually given. In some animals, recovery occurred when six tenths of the estimated blood had been lost, while in others death would occur after four tenths. It was impossible to estimate, in any given animal, with any degree of accuracy the proportion of blood to its body weight it might lose and recover. What, then, are the factors entering into the fall in the blood-pressure and its recovery? It may be assumed that the primary factor is anæmia, thereby lessening the immediate nutrition of the active physiological mechanism for the maintenance of the normal blood-pressure.

Of these factors, we may assume that the vasomotor center stands first. We may further grant that the exosmosis from the tissues into the vascular system is also a factor. That the vasomotor center is a most important factor is shown by the following.

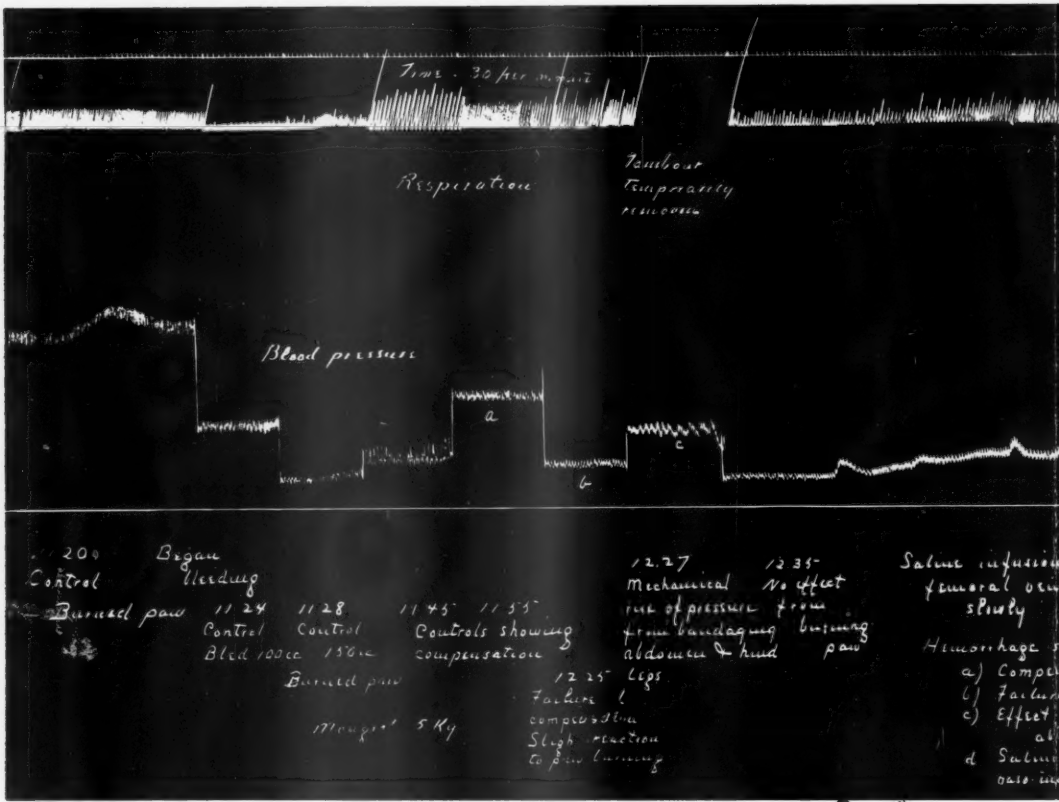
1. When an animal was bled very considerably, even to a dangerous degree, and there was still some natural compensation, though amounting to only a few millimeters of mercury, and this animal was then given a therapeutic dose of strychnine, the blood-pressure was usually considerably raised over a short period of time. Since this rise in the blood-pressure as a result of the physiological dose of strychnine is known to be due to a stimulation of the vasomotor center, we may, then, conclude that could the vasomotor center have a spontaneous stimulation, or an automatic stimulation equal to that of strychnine, and should this stimulation of this center be continued, the animal would make a prompt and effective recovery from such degree of hemorrhage. On the other hand, if no strych-



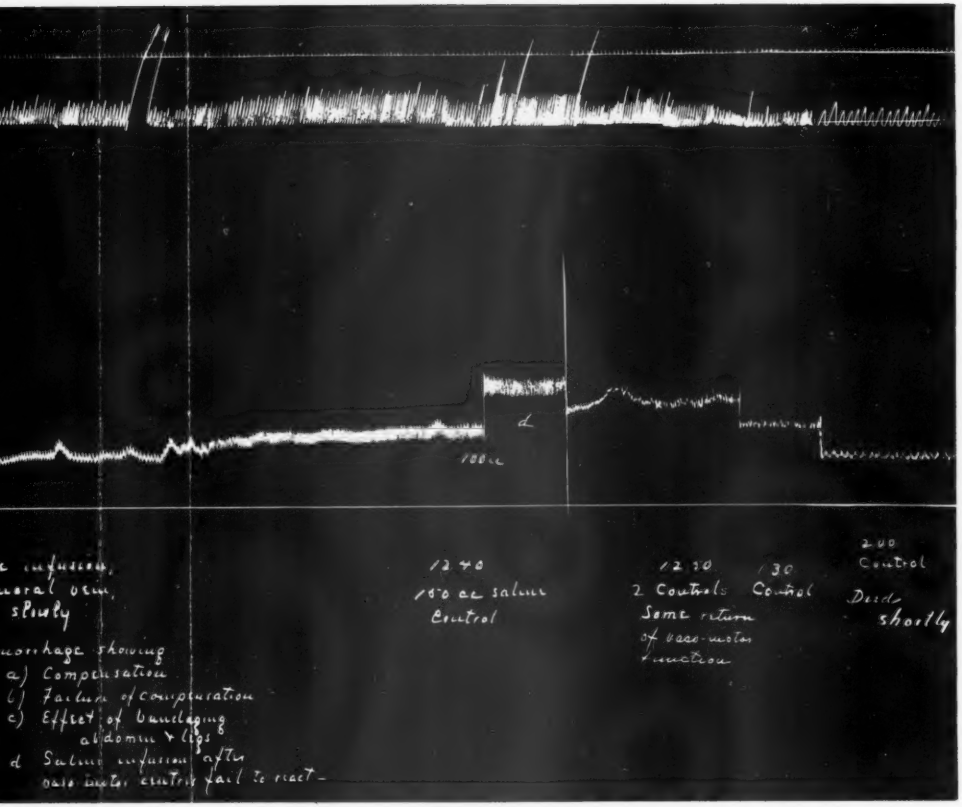

Tracing I. Intravenous infusion of salt solution after hemorrhage, started before complete failure of the vasomotor c
Strychnine in therapeutic dose, given at the beginning of the decline, raised the blood-pressure temporarily 7 mm., but af
reaction of the vasomotor center to peripheral stimulation (not shown on the tracing), a second dose of strychnine had no
upper tracing is respiration, the lower, blood-pressure. Time in seconds.)




he vasomotor center, only partially reactivated it, and the blood-pressure quickly fell from the maximum level reached 7 mm., but after one half-hour, after a further fall of blood-pressure, associated with a progressive diminution of the ychnine had no effect, and while a third dose evoked convulsions, the rise of pressure was relatively small. (The




Tracing II. (*a*) Compensation after profound hemorrhage (rise of 50 mm. of Hg.). (*b*) Failure of compensation, associated mechanically by bandaging abdomen and extremities (rise of 22 mm.). (*d*) Intravenous infusion of salt solution, after almost com




on, associated with diminished reaction of the vasomotor center to peripheral stimulation. (*c*) Blood-pressure raised r almost complete failure of the vasomotor center, reactivated it only partially and temporarily.

nine is given in such a case, the blood-pressure is likely to remain at or near the level of the first compensation, and after a period of time, and inversely with the lapse of time, the effect of a later stimulation is less marked. This is to say, it would seem that the vasomotor center becomes less active on account of a continued anæmia.

2. In animals in which the vasomotor center has been previously impaired by shock, the compensation after hemorrhage is less marked, and its response to vasomotor stimulations likewise less.

3. In animals in which all the centers are greatly reduced by reason of malnutrition or disease, compensation is less marked.

4. Negatively, in a hemorrhage experiment the heart itself is unable materially to affect the blood-pressure, because it has been shown that the rate and force of the heart's contraction have but a limited range in their power to raise the blood-pressure under any and all circumstances.

It may, too, add to the support of the vasomotor factor to note that if a large dose of adrenalin is added to the circulation even after death, and the heart's action is instituted by manual pressure, the blood-pressure still may rise. That is to say, the question of compensation (hence, recovery after hemorrhage) is very largely one of dynamics, and concerns primarily the vasomotor center. Since it is noted that the addition of any fluid to the circulation in the lower, though not the lowest, states of the blood-pressure causes a rise in the pressure, we must grant that the addition of fluid from the extravascular tissues of the animal itself must, on the grounds of analogy, play its part, though it be a minor one. The specific gravity of the blood, the hæmoglobin determination, and the red-blood count, all show very marked variations in the different experiments and in the various parts of the same experiment. The first effect noted upon the respiration in the primary arterial hemorrhage is an increase.

*On the Effects of Certain Drugs in Hemorrhage.* The effect of drugs varies in the different parts of the circulatory apparatus in the various degrees of arterial hemorrhage. They not only showed these distinctions, but also presented a marked difference in their effects in the various periods of time after the hemorrhage at which they were administered.

*Strychnine.* The effect of strychnine immediately given in the various degrees of arterial hemorrhage diminished as the hemorrhage increased. After a slight hemorrhage, the blood-pressure was raised almost as much as in the control dog. In profound hemorrhage, in a few instances no effect on the blood-pressure was noted. When the therapeutic doses of strychnine were repeated in the cases in which there was a distinct effect upon the blood-pressure, the effect of the second dose was usually less marked than that of the first, and sometimes no effect whatever was noted. However, in all the instances of profound hemorrhage, the longer the interval between the hemorrhage and the administration of strychnine, generally speaking, the less marked was the effect of strychnine upon the blood-pressure. If, however, there was still left some compensatory power in a profound hemorrhage, and the blood-pressure was first raised as much as possible by saline infusion, the effect of strychnine was then more marked.

*Heart.* The effect of strychnine upon the heart was more marked in the case of deep hemorrhage than with the control dogs. Its apparent effect upon the heart, however, in any of the experiments, excepting those in which a large hemorrhage had been produced, was not marked.

*Digitalis.* What has been said as to the effect of strychnine upon the vasomotor center may be said of digitalis, although in the case of digitalis there was markedly greater uncertainty and irregularity in the results.

*Heart.* The effect of digitalis upon the heart showed a more distinct difference. The deeper the hemorrhage, the lower the blood-pressure, the more marked were the effects upon the heart; these effects being an alteration in the rhythm and the frequency of the heart-beats, and in many cases sudden cardiac failure. The action on the heart was more constant than the action on the vasomotor center.

*Saline Infusion.* In the vast majority of the experiments, saline infusion was followed by an immediate rise in the blood-pressure, with an increase in the pulse volume and the

output of the heart, as indicated by an increased length of the stroke of the writing style. In the experiments, however, in which the blood-pressure was reduced so low that no natural compensation was noted, occasionally it was found that there was no rise in the mean blood-pressure on administering saline infusion. The increase in the output of the heart and in the pulse volume, at the same time, was markedly increased. In the majority of instances in the various degrees of hemorrhage above the latter, the effect of saline solution was that of raising the blood-pressure. However, in the cases in which the saline infusion was given rapidly, the highest point first obtained was usually not maintained. In some instances the blood-pressure would continue to rise after cessation of the saline infusion, and the general condition of the animal was markedly improved, but in other instances, especially those in which hemorrhage was profound, the saline infusion caused extreme embarrassment of the heart action, even a fatal dilataiton. We may then consider the effect of the saline infusion under the headings: 1. Its effect upon the vasomotor center; and 2. Its effect upon the heart.

1. *The Vasomotor Center.* For the most part, the vasomotor centers seem to be favorably influenced by the increased blood-pressure and increased circulation established by the infusion. There were instances where, even though there was no increase in the vasomotor action, it at least held its own at a higher level; then, again, it was sometimes noted that after a saline rise in blood-pressure, burning the paw elicited a greater activity of the vasomotor center than was noted before. In these cases, too, the administration of strychnine caused a more marked effect upon the vasomotor center. That is to say, it seemed that the increased circulation through the vasomotor center by means of the saline infusion brought back renewed activity of this center. There were no cases in which it was clearly observed that saline infusion affected the vasomotor center especially unfavorably.

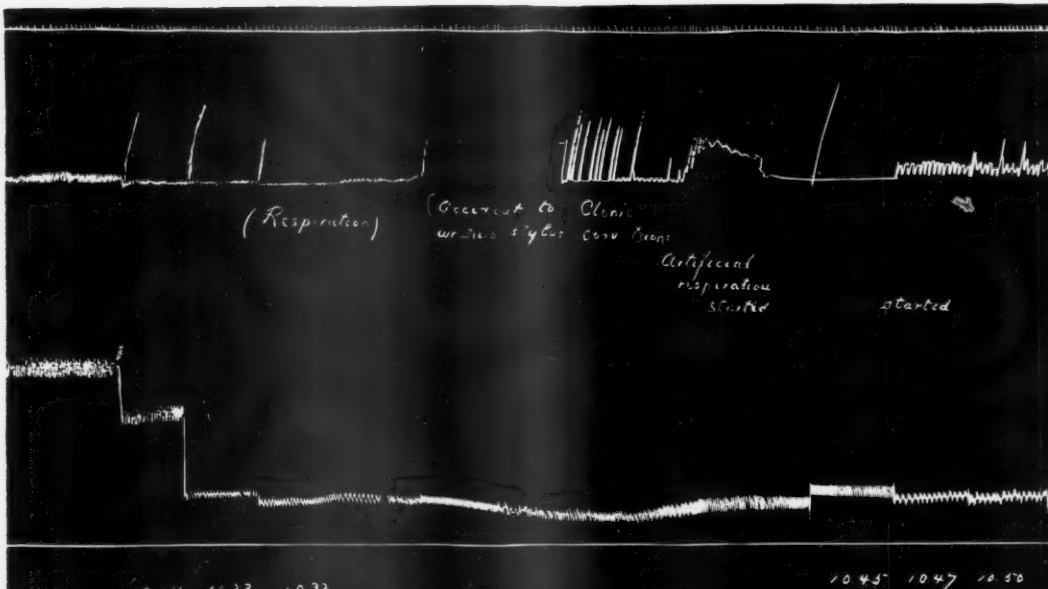
*Heart.* While in the case of the vasomotor center the effect of saline solution was either to improve it, or at least not to damage it, in the case of the heart the same results were not always noted. In certain instances, especially when the infusion was given rapidly, an acute, sometimes fatal, dilatation of the heart was noted. Many times the heart was greatly embarrassed, though it finally recovered. It is well here to call attention to the fact that the work of the heart when the volume of fluid is augmented is increased in a geometric ratio. That is to say, if twice the amount of fluid were suddenly thrown into the heart, its work would be increased fourfold. It was found more effective to give a guarded infusion at first, noting the effect upon the heart, then gradually increasing as the heart itself became able to assume more work. Substitution of oxygenated Locke's solution for normal saline seemed, on the whole, to act better.

*Effect of Saline on Other Tissues.* When the saline infusion was given continuously in rather too large amount, it was rapidly transferred to the splanchnic area, escaping through the vessels here, filling the walls of the hollow viscera, and even escaping into them. The effect, then, of saline infusion is limited to such effect as it may have in its transit through the circulatory apparatus. The effect of saline infusion in respect to the heart and the vasomotor center, as in the case of strychnine and digitalis, depended somewhat upon the length of time that elapsed before the ending of the hemorrhage and the beginning of the infusion. The later the infusion, the less favorable was the effect of the solution.

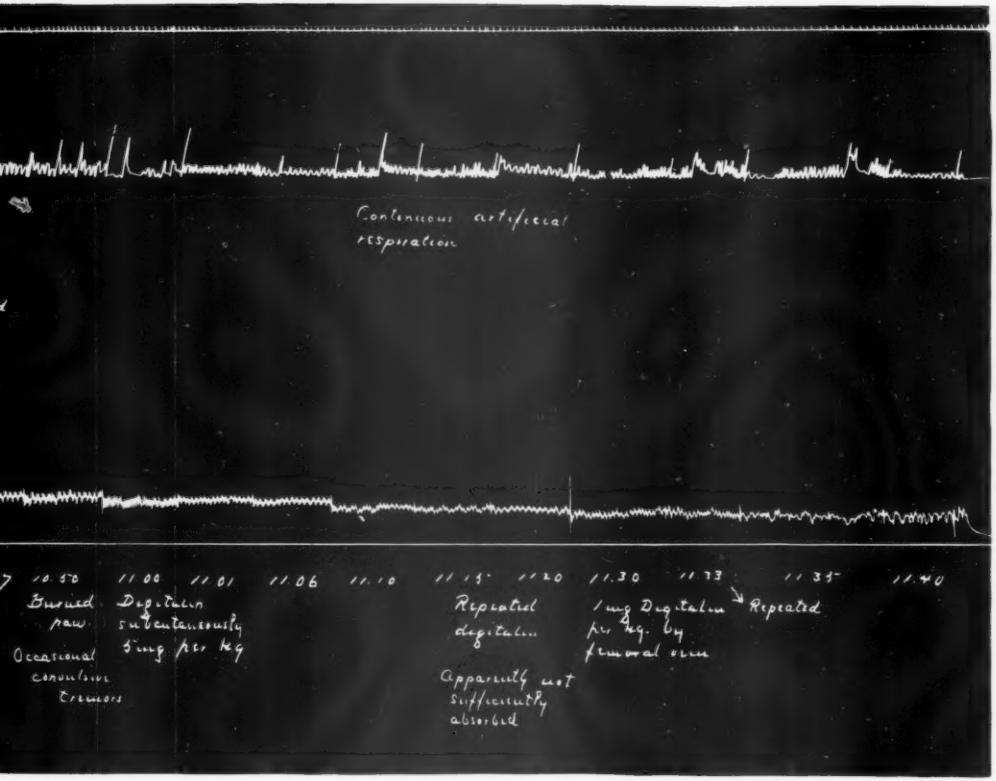
*Mechanical Means of Treatment.* Bandaging the extremities and the trunk raised the pressure and maintained it, though the rise was not large, and no unfavorable effects were noted.

The red cells and other formed elements of the blood reform with great rapidity. For example, in an animal with a normal of 5,000,000 of red cells the count had fallen to 1,500,000, but within a week the normal number was regained. The specific gravity of the blood first fell, then rose rapidly. This rise was noted almost immediately after the greatest depth of its fall. Marked waves, not only in the specific gravity, but also in the blood count, were noted.

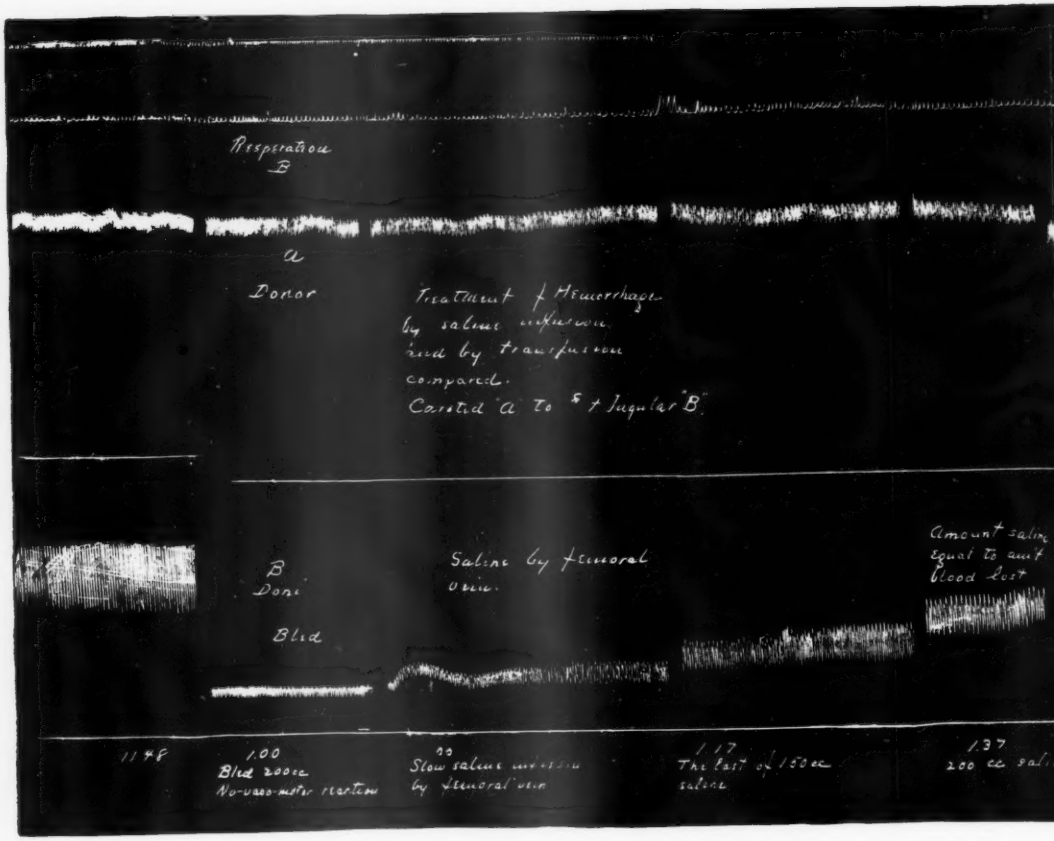
*Oxygen.* The favorable effect of oxygen inhalation during the critical stages of hemorrhage was in almost every instance well marked.



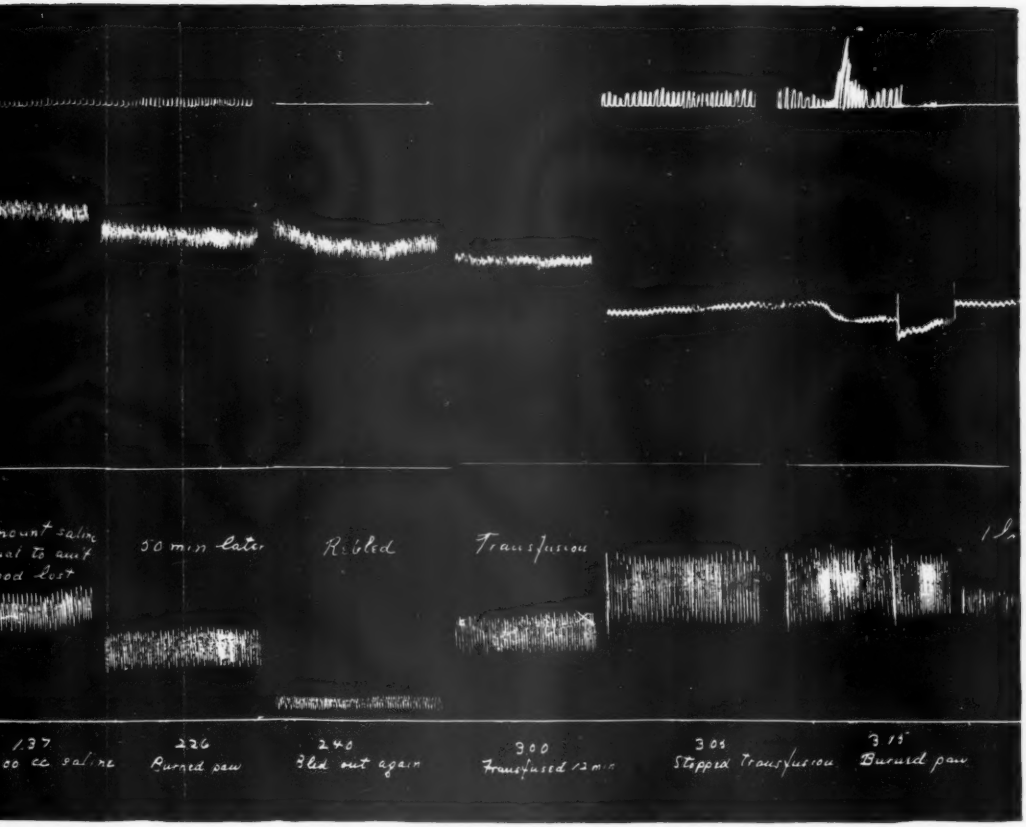

Tracing III. The effect of drugs after hemorrhage, the vasomotor center not reacting to peripheral stimulation (10.32 contro parently susceptible animal, but even with this reaction there was no rise of blood-pressure. (*b*) Digitalin subcutaneously was ap




(10.32 control). (*a*) Strychnine in usual therapeutic dose for anæsthetized dogs unexpectedly evoked convulsions in an ap- eously was apparently not absorbed, but a moderate intravenous dose (2 mg. per kg.) caused rapid cardiac failure.




Tracing IV. The efficiency of the treatment of hemorrhage by intravenous saline infusion




ine infusion and by transfusion of blood from a second dog compared on the same animal.

Recent researches, the details of which will soon be published, have established a method of treating hemorrhage which promises to be extraordinarily effective. It consists of making an end-to-end anastamosis between an artery of a donor and any vessel of the donee. In this manner the lost blood, or a sufficient part of it, may be readily transferred. The treatment seems to be absolutely effective, even after the respiration and the circulation have ceased.

### HEMORRHAGE IN OPERATIONS

It is always well to bear in mind, in estimating the effect of hemorrhage in a strong subject in an operation, that from two to three per cent of the body weight may be lost in hemorrhage withou materially changing the blood-pressure; that the blood-pressure is thus maintained at the expense of an increased action of the vascular nerve mechanism; that such a patient, despite the apparent good circulation and well-sustained pulse, cannot withstand shock or other depressing factors as well as a patient having a similar pressure, but who has lost no blood. It is well, too, to remember that a rapid arterial hemorrhage, causing a more sudden anæmia of the bulbar centers, incites a marked stimulation of these centers, tending to bring about a recovery of the blood-pressure. On the other hand, a slow venous or capillary hemorrhage does not cause this sudden anæmia; it more directly deprives the heart of blood, and is therefore attended by a more considerable fall of the blood-pressure. The conservation of blood in any surgical operation is a matter of supreme importance.

It is, we believe, a good rule to operate only in a dry field, picking up all vessels as they bleed, or, if possible, before their division, and finally tying them. For, although at the end of an operation, when the blood-pressure has been depressed, when one removes the clamps, but few vessels may actively bleed, yet with the rebound of the circulation, especially during vomiting, when there is a marked increase in the venous pressure, oozing is quite sure to occur.

In amputations, resections, etc., the method of plain dissection has been employed in the past few years in most instances; that is to say, an amputation of the thigh is done by precisely the same rules of dissection as an amputation of the breast. It is true that with a tourniquet less blood is lost during the division of the tissues, but the total amount finally lost during the first twenty-four hours, by applying the methods of plain dissection to these operations, has certainly been lessened. Not only is the total amount of blood lost less, but in the case of the Esmarch tourniquet on account of the temporary vasomotor paralysis, oozing continues a considerable time after the operation has been completed. That is to say, there is quite certain to be oozing after the patient has been reduced by shock and can least afford any additional depressing factors. The first twenty-four hours are likely to pass more evenly following a plain dissection than by tourniquet.

In the heavier operations of the neck, face, and head, a method, previously described, of temporarily closing the large arteries by means of a special clamp has been used. This has been applied 61 times among 680 operations in this region. No ill results have been noted. The ages varied from 9 months to 79 years. The common carotid artery is so readily exposed, provided one disregards the teachings of anatomists, and merely makes an intermuscular division of the sternomastoid and picks up the artery, that it adds but little to the operative technique. The closure of this artery does not entirely control even the arterial hemorrhage of the region supplied, on account of the rich anastomosis of both the external and internal carotids. We have seen, for example, in elderly subjects with atheromatous vessels and a high blood-pressure, a distinct recurrent pulse in the branches of the external carotid artery when the common was totally closed by the clamp. The opposite artery supplied such a volume of blood under high tension to the brain, that a pulse wave extended through the periphery in the brain back to the internal carotid to the bifurcation of the common, then up the external carotid into its terminal branches, thus giving a pulsating circulation from the opposite side and from the periphery. This, however, is quite unusual. It is obvious that in such a case as

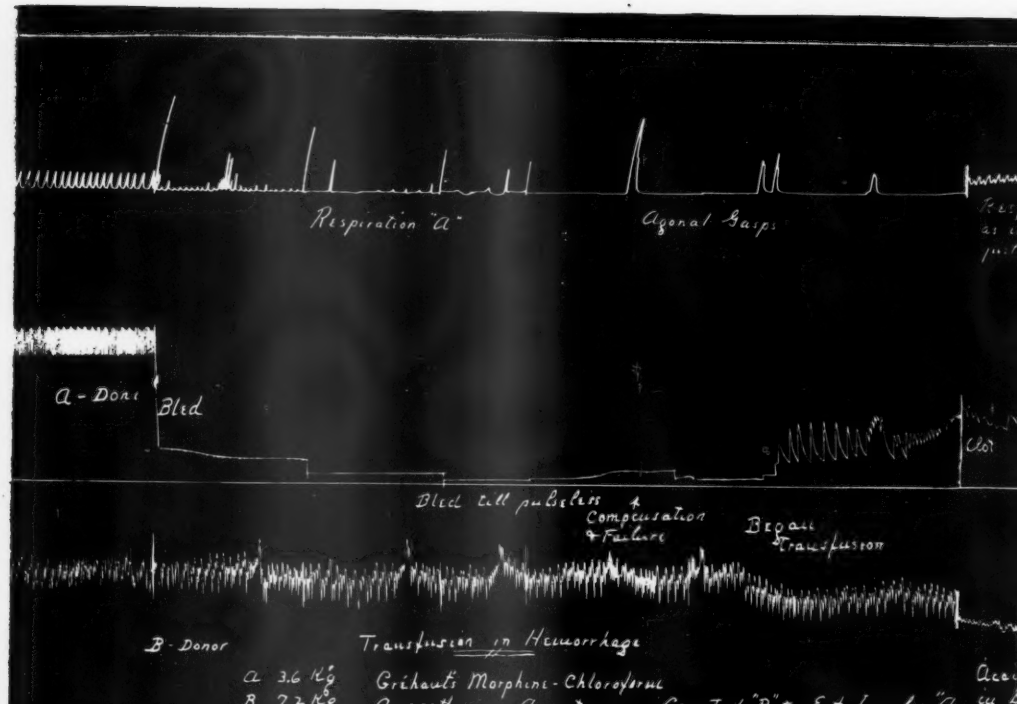
this it would be more effective to close the external carotid, rather than the common. The closure of both external carotids would naturally entirely control the arterial hemorrhage. Both common carotids have been closed in several instances. It is interesting to note in these that the patients required but little anæsthetic. If one should do this, it is quite important to keep a close observation upon the respiration, as it is more affected than the circulation. We have not found that closure of the common carotid artery is of any special advantage in those brain operations in which the principal risk of hemorrhage is from the venous circulation. We usually close the common carotids in the operations for excision of the Gasserian ganglion, because it so much minimizes the hemorrhage in dividing the heavy, soft tissues encountered in this operation, as well as the blood-supply of the diploë and the coverings of the brain. After this stage of the operation is passed, closure has no longer any influence upon hemorrhage, because the remainder of the hemorrhage is almost wholly venous. The venous hemorrhage is greatly minimized by the inclined head-up posture with the pneumatic suit. Closure of the common carotid has been strikingly helpful in aneurysms of the various portions of the scalp, skull, or orbit. Recently, in an operation upon a large bulging tumor, protruding through a former osteoplastic operation on the skull, the hemorrhage was better controlled by the application of rubber dam applied as a close-fitting turban, and then making the incision through the rubber dam in a quite bloodless field. The rubber dam turban has since been used in securing anæmia of the skull in other operations.

In operations in the oral cavity, such as cleft palate, excision of the tongue, jaw, etc., the anæsthetic is given at a distance from the patient by means of rubber tubes placed through the nares, according to a method mentioned in the *Annals of Surgery* several years ago, and more fully described in another paper in this number.[1] By this method a continuous, even anæsthetic may be maintained, not a drop of blood can be inhaled, the anæsthetizer is entirely away from the field of operation, and one is as free to execute in an unhampered way the technique as in herniotomy. Not only are certain dangers and inconveniences obviated, but in case of cleft palate operations, for example, one may easily pack a large piece of gauze firmly against the palatine artery, quite effectively controlling the hemorrhage. In partial excision of the tongue the pharyngeal packing may be so arranged as practically to close the supplying arteries, effectively controlling the hemorrhage. We have noted in cleft palate operations the absence of the febrile rise and other symptoms of sapræmia which so frequently followed the former technique. There is no simple procedure in our experience that has yielded such splendid results as the intubation of the pharynx in operations in the oral cavity.

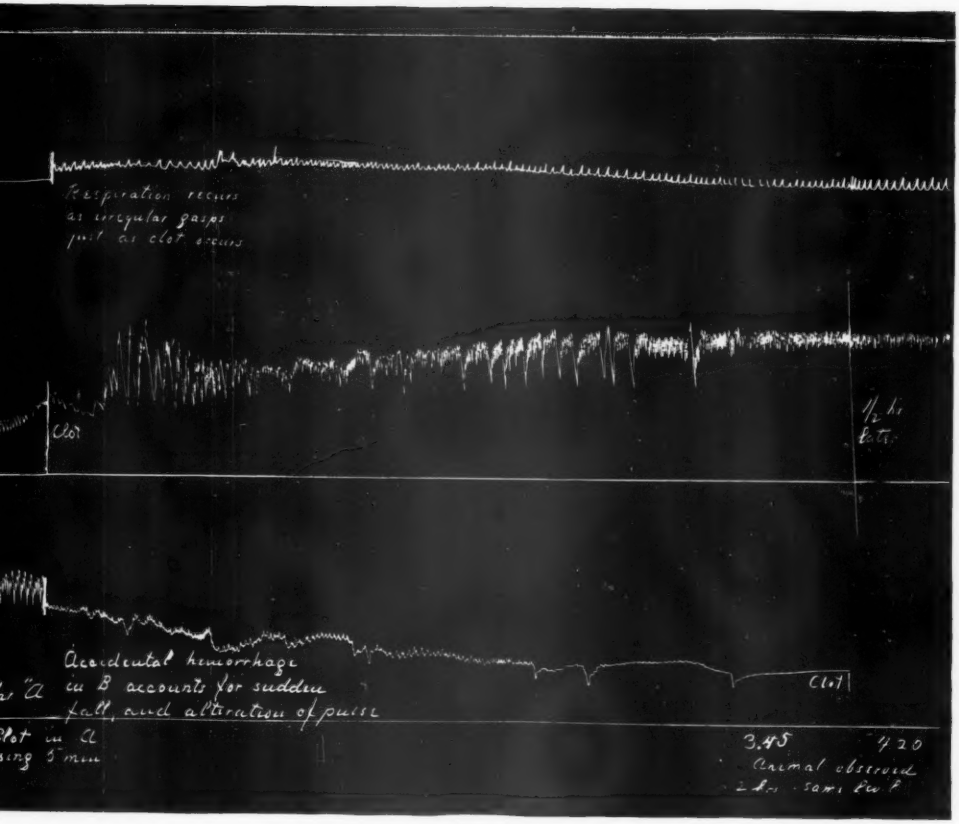
In tumors of the neck, in all suitable cases the artery is temporarily closed. In addition, if there is an unusual risk of hemorrhage, the patient is also incased in a rubber pneumatic suit and placed in a 45° upright posture. In this way, by taking advantage of gravity, the large venous trunks are emptied of their blood, and a splendid anæmia is obtained. One need only note the fading out of the superficial vessels as the upright posture is assumed, to appreciate how much the hemorrhage is minimized. With the arterial hemorrhage very largely controlled by the closed artery, and the venous hemorrhage minimized by posture, one is able without difficulty to keep a dry anatomical field for the clean dissection of any portion of the neck. The object of the rubber suit, of course, is that of assuring ourselves, in case there is some failure of the vasomotor center, of a safe amount of blood in circulation in the thorax and the brain by preventing its accumulation in the lower extremities and the abdomen.

In the first interscalpulo-thoracic amputation there was applied the technique later employed and published by Cobb, Lund, and Cushing; namely, that of making an incision over the clavicle, blocking the brachial plexus with cocaine to prevent shock, then tying off both the artery and the vein preliminary to the technique of amputation. In this case it was

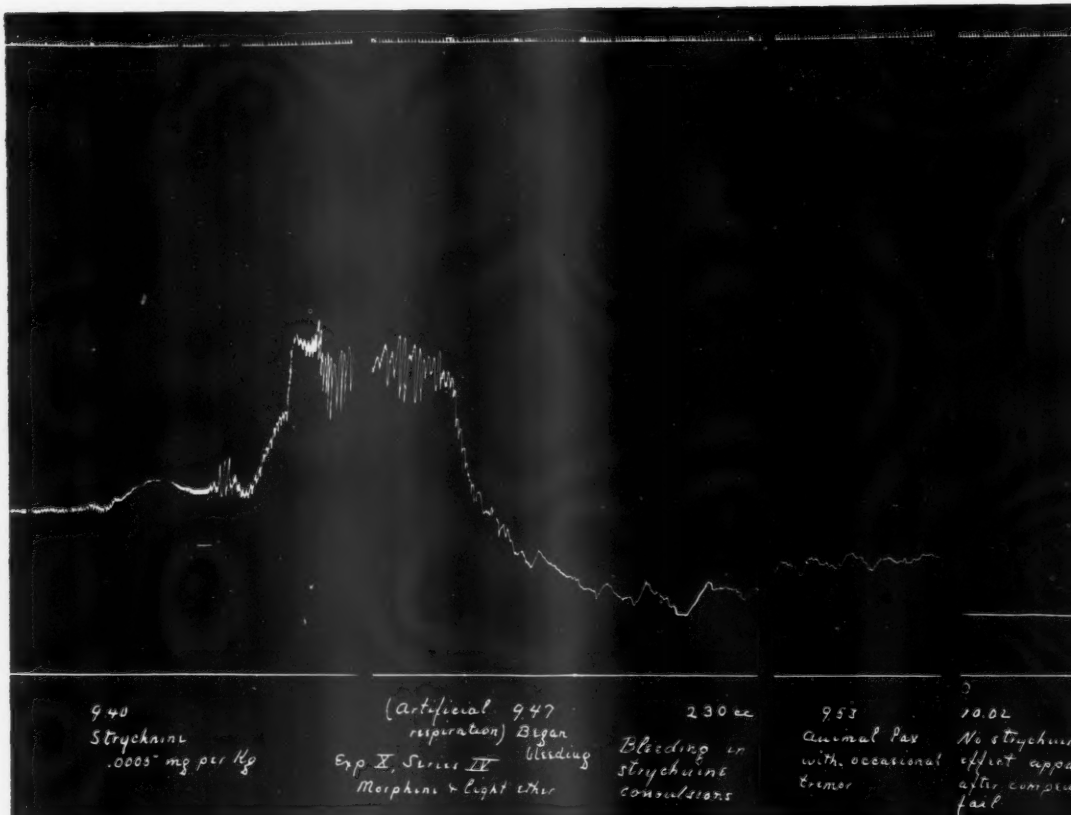
[1] Referring to paper on "Technique of Tubation of Pharynx in Face and Neck Operations," by J. H. McHenry, M. D.



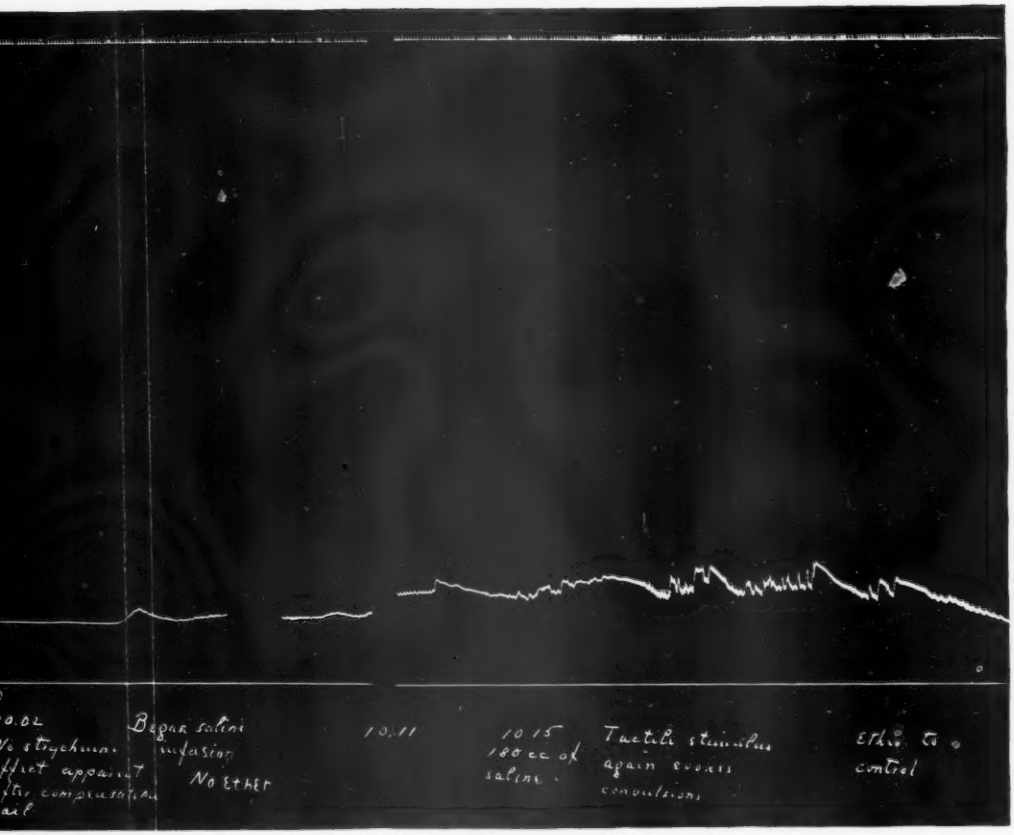

Tracing V. Transfusion after complete exsanguination to the point of respiratory, though not cardiac, failure rest



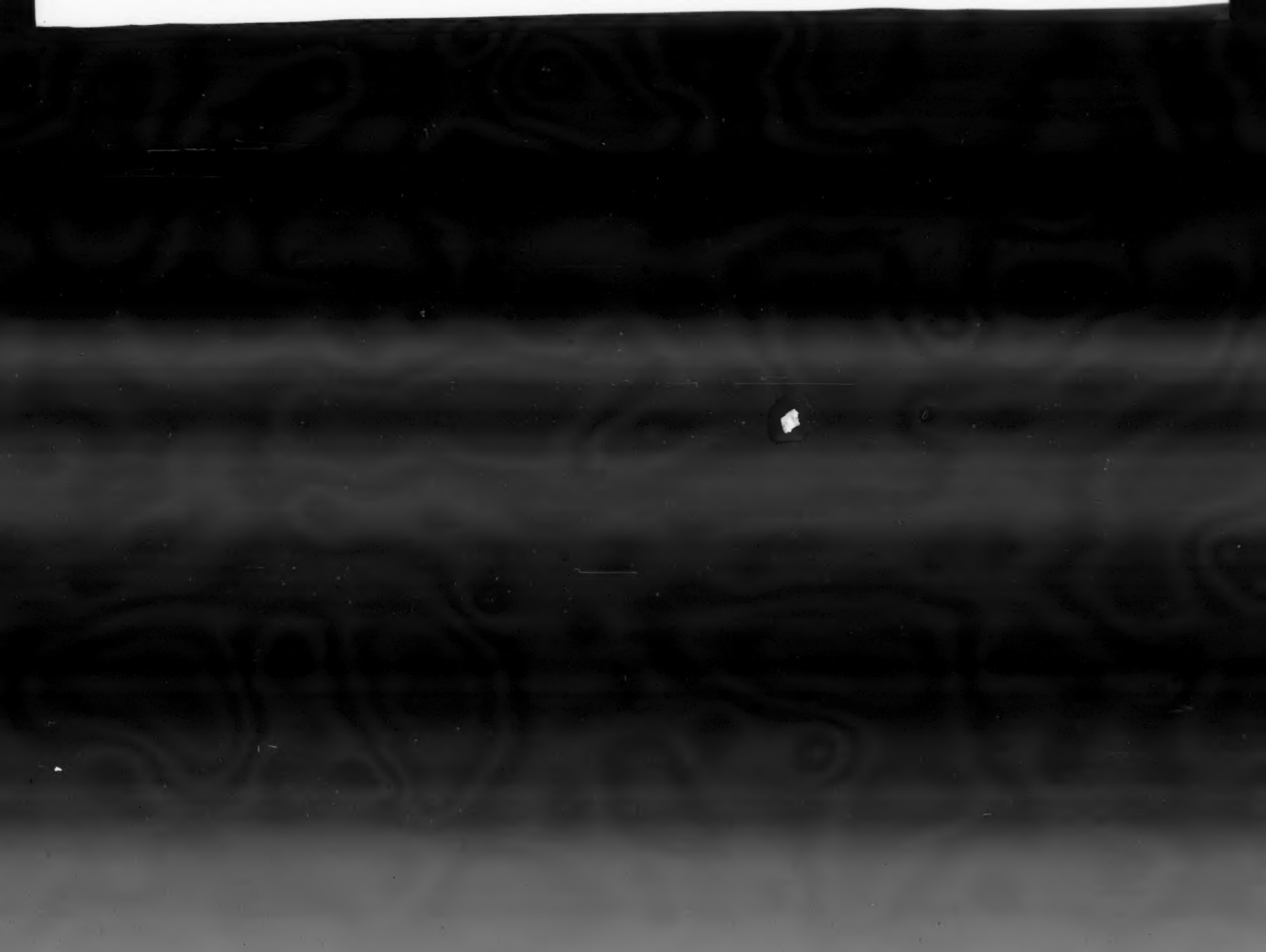

c, failure restored the animal, and steadily maintained the blood-pressure during an observation of 2½ hours.




Tracing VI. Strychnine convulsions after a slight overdose completely controlled by rapid bleeding to a level of 36 mm. Hg. w
to 56 mm. (initial level 100 mm.) by means of saline infusion.




6 mm. Hg. without the use of ether (animal under morphine). The convulsions recurred when the blood-pressure was raised



surprising to find a large amount of blood had accumulated in all the vessels of the arm and shoulder through the collateral anastomosing vessels, and whereas there was but little loss of blood from the operation itself, there was an unnecessary loss of blood in the distended vessels of the shoulder and of the arm. In the next case the device suggested by Cobb of Boston was employed, of pressing the blood out of the arm and putting a tourniquet around the arm for the purpose of preventing the influx of blood into the otherwise empty vessels.

### SECONDARY HEMORRHAGE

In a personal experience of more than six thousand major operations, there have been very few cases of secondary hemorrhage. Among these were two following operations for acute suppurative appendicitis. In one case there were repeated hemorrhages, the first appearing ten days after the operation, the last and fatal one, eighteen days later. In this case the major portion of the blood passed into the intestine as a concealed hemorrhage.

Another case of fatal secondary hemorrhage occurred in the wound made by an incision to open an extensive abscess of the neck following diphtheria. In this case the child was extremely reduced, was pale and septic. The hemorrhage came from many small vessels in all the parts of the abscess cavity — a general oozing which could only be controlled by ligature of the common carotid artery. The child died later, of infection.

Another case of secondary hemorrhage followed a misjudged operation for carcinoma of the lower jaw and glands of the neck, in which it was found practically inoperable. The hemorrhage came on the eight day after the operation, and was controlled by ligation of the common carotid under cocaine, and was followed by recovery.

Among 121 operations upon the biliary passages, there were encountered two instances of hemorrhage from the gall-bladder, the hemorrhage consisting in an oozing from its mucous membrane, continuing at intervals, in the one case, of seven days, and in the other, of twelve days, and finally ending in recovery.

As several of the masters in the surgery of this region have pointed out, when there are petechial hemorrhages in the presence of jaundice, the risk of hemorrhage is too great to warrant any operative procedure. In our clinic we have, in all cases of jaundice, or of long-continued gall-bladder disease with intermitting jaundice, made preliminary coagulation time tests, and if the coagulation time was ten minutes or more, no operation was advised. In both of the cases of secondary hemorrhage above mentioned, the coagulation time was six minutes or under.

In the treatment we have depended upon local measures, such as packing, and the administration of calcium chloride in from forty to sixty grain doses, given by the mouth, by the rectum, or subcutaneously, according to circumstances. In the cases in which this drug was given prior to an operation, where coagulation time was rather too long, it was noted that it required the administration in large doses over a number of days before the coagulation of the blood is materially changed. We have but little reason to believe that calcium chloride is an effective remedy in an immediate emergency. There has not been noted any hemorrhage from other tissues than the mucous membrane of the gall-bladder, and should an instance of severe hemorrhage be encounted again, a cholecystectomy would probably be employed after the failure of the more common remedies. We have not yet seen a single instance of secondary hemorrhage in an aseptic wound excepting in the case of hæmophilia.

### TREATMENT

The arrest of hemorrhage is so largely a matter of technique, and in almost every instance is so specialized by location and circumstances, that we shall not omit it, and shall briefly consider the immediate general treatment of acute hemorrhage.

The problem resolves itself into the temporary application of the most effective measures of preventing a fatal anæmia of the heart and the brain. These measures naturally fall into two classes: 1. Therapeutic; 2. Mechanical.

Among the therapeutic measures, morphine to secure rest is frequently important. Among the stimulants, strychnine is important, but in

the serious cases it should be cautiously given. Its effect is heightened by first raising the blood-pressure by the infusion of saline or Locke's solution. In great urgency, it may be administered slowly in this solution. Digitalis, like strychnine, is least beneficial when most needed. If sufficient dosage be administered to effect the vasomotor system, the heart may be fatally overstimulated. Adrenalin has a remarkable effect upon the blood-pressure, but its effects are fleeting. A sudden cardiac break-down may unexpectedly occur.

Among the mechanical measures, normal saline or Locke's solution is perhaps most important. In intravenous infusion in the anæmic heart, it is imperative to bear in mind the possibility, or, may we not add, the probability, of an acute dilatation of the heart. When the pulse shows a large wave, with but little resistance and a markedly slowed rhythm, great caution is necessary. It must also be borne in mind that the blood does not tolerate much dilution; that excessive saline passes rapidly through the vessel-walls, accumulating in the splanchnic area and in the pleural cavity and the lungs.

Posture is a measure of self-evident value, and cannot well be overestimated. Conversely, change from the head-down position involves great risks. Not only cerebral anæmia, but sudden heart failure may follow.

Bandaging the extremities and the abdomen over heavy layers of cotton is an effective aid; even more effective is the application of the pneumatic rubber suit.

Artificial heat, so applied as not seriously to disturb the patient, or to interfere with more important measures, should be employed.

In profound hemorrhage in which the number of red cells are so greatly reduced as seriously to decrease the amount of oxygen carried to the vital centers, the administration of oxygen is a most effective remedy. Indeed, there is a stage of hemorrhage characterized by such a degree of suboxidation that the arterial blood assumes a peculiar port-wine hue in which recovery is not possible without the freest inhalation of oxygen.

Illustrative of the value of mechanical pressure, a cut-throat patient was admitted to the wards of Lakeside Hospital, exsanguinated and pulseless. Saline infusion and stimulants had been given in maximum amounts during twelve hours, but the circulation always relapsed, and at the time of application of the rubber suit the pulse was barely perceptible, the respiration gasping, and the patient was unconscious. On applying firm pneumatic pressure up to the costal borders, the pulse became immediately better, the blood-pressure rising to 110 mm. mercury, and consciousness was regained. The suit was worn during twelve hours, when her condition had sufficiently improved to warrant a gradual decompression. Recovery followed.

The management of a recent case is illustrative of our conception of meeting a crisis in hemorrhage.

A delicate ten-year-old girl, with very extensive tubercular glands in both sides of the neck and extending into the thorax, was first subjected to excision on one side, and later on the other. In the course of the latter, the glands were firmly adherent, and extended well down below the clavicle and the sternum. While separating with difficulty the last large gland with the forefinger, there was a large gush of arterial blood from a lacerated subclavian artery whose wall had become pathological from the closely adherent infected gland. The wound was at once firmly packed, and a massive pyramid of gauze was applied under pressure.

At the end of seven days the hemorrhage was renewed and the patient became quite exsanguinated. The bleeding was then temporarily controlled by pressure, while preparation was made for ligating the innominate artery. A full therapeutic dose of morphia was given, the lower extremities and the abdomen were covered with heavy layers of cotton batting and firmly bandaged. After the morphia had reached the maximum effect, she was cautiously anæsthetized, an assistant gave simultaneously in the median vein a saline infusion at the rate of 3 c.c. per minute, and more rapidly during the rapid hemorrhage during the exposure of the artery. The innominate was then ligated below the vertebræ, collateral circulation returned 12 hours later, and the child made a good recovery.

# AMERICAN GYNECOLOGICAL SOCIETY

ORIGINAL ARTICLES, WITH A REPORT OF THE DISCUSSION[1]

## THE SEARCH AFTER TRUTH

THE PRESIDENT'S ADDRESS BEFORE THE AMERICAN GYNECOLOGICAL SOCIETY, HOT SPRINGS, VIRGINIA, MAY 22, 1906

BY RICHARD B. MAURY, M. D., MEMPHIS, TENNESSEE

BEFORE entering upon the subject proper of my address, I feel that it would be remiss, on the present occasion, did I not make allusion to the great loss which we have sustained as a society since our meeting in Niagara a year ago.

Sorrow has come upon us in the death of four of our brightest, most talented, and devoted fellows.

A. Palmer Dudley of New York; James R. Chadwick of Boston, who is regarded as the originator of this society; Arthur W. Johnstone of Cincinnati; and R. Stansbury Sutton of Pittsburg, true and brave men, in the prime of life and usefulness, have been called away from their labors. They will long be missed from their places in our ranks, and our society will deeply feel their loss in its deliberations; but to abler pens than mine will fall the duty of recording their life-work, and of offering an appropriate tribute to their worth.

We may nevertheless pause to drop a tear, and then pass on, after invoking "In Memoriam" the Son of God, in the beautiful words, with which you are familiar:

> "Thou wilt not leave us in the dust;
> Thou madest man, he knows not why;
> He thinks he was not made to die,
> And Thou hast made him; Thou art just."

For a period of twenty-five years I may bear witness that our professional lives, yours and mine, have been one continual, never-ceasing struggle to find the truth. And the question is still and ever before us, What is Truth?

In the words of Ernst Haeckel, "This great question has occupied the more thoughtful of men for thousands of years, and has elicited myriads of attempts to answer it — myriads of truths and untruths. Every history of philosophy gives a longer or shorter account of these countless efforts of the advancing mind of man to attain a clear knowledge of the world and of itself."

But Truth is elusive, is hard to grasp; indeed, it is represented as a veiled statue, the mantle of which we are trying continually to tear away, but with only partial success.

The history of this society is but an account of our efforts to find a truthful solution of the numerous problems which confront us in the nature and treatment of the manifold diseases of women.

With a full recognition of the great advances made in some departments of medicine, we must acknowledge that many problems which we have been trying to solve, and at one time supposed we had solved, now seem more difficult and further from solution than ever before.

My meaning will be made more clear if you will follow me in some remarks on the subject of uterine displacements, which I have selected for the purpose of illustration.

In the year 1888 this society discussed the subject of anteflexion. It numbered among its fellows many brilliant minds and leaders of medical thought. The discussion was opened by that polished scholar and brilliant teacher, T. Gaillard Thomas, who had devoted years to the study of the subject, and who had at his command large clinical material. Beside him sat Graily Hewitt of London, who had come across the Atlantic to take part in the discus-

[1] For report of the discussion of the various articles, see pages 162 et seq.

sion of that subject, which, in the words of the essayist, he had done more to further than any other man. Sir William Priestly was there also — another distinguished English physician.

Dr. Thomas felt that he was able to shed new light upon an ancient theme, and, while much had been done toward the elucidation of the subject, much more remained before its treatment could become easy or satisfactory.

He thought it impossible that any man could attain success in the treatment of anteflexion without the recognition of a nomenclature which he then offered.

His ætiology was simple; the most frequent causes being heavy skirts and tight lacing on the one hand, and fæcal distention of the rectum on the other.

He said: "The idea that anteflexion is to a great degree a normal condition, that it is answerable for very little constitutional disturbance, and should, as a rule, be ignored, is a pernicious error, having usually for its basis either want of experience, or a desire to avoid an issue for which the speaker feels his resources inadequate."

These conclusions he had reached after an experience of thirty years. He assumed that the man who would not use pessaries in the treatment of anteflexion was unfit to practice gynecology.

The instruments he recommended were the various forms of anteflexion pessary, and the intrauterine stem — the glass intrauterine stem, not gold or silver. From such means he had often achieved the most beneficial results, although he had had many instances of utter failure.

The views of the speaker were indorsed by Grailly Hewitt, who had spent a great portion of his life in the study of anteflexion, who had devised a pessary for its relief, and whose teachings dominated medical thought on this subject in England. He thought that what Dr. Thomas had said about the treatment of anteflexion by pessaries was all that could be desired, and embodied the truth.

Six of our ablest fellows took part in that discussion — men prominent as teachers, and of abundant experience. Some, in accord with the essayist, advocated the use of pessaries. Two were very positive of the benefits derived from the intrauterine stem, which they had used for many years. One declared in favor of the operation for division of the posterior lip of the cervix, and stated that he had done Sims's old operation more than four hundred times, splitting the canal forwards and backwards, and that seventy-five per cent of his cases had thereby been cured of sterility.

Dilatation and drainage with the perforated stem was also commended as a remedy for the imperfect development and the endometritis, which were supposed by the speaker to constitute the essential features of the disease. The ætiological factor now regarded as most potent in pathological anteflexion, viz., parametritis and perimetritis, had been plainly taught in Germany for several years by Shroeder and Schultze, but was not alluded to in this discussion, except by Dr. Emmet, who, being absent, was quoted that "the largest portion of flexions have their origin in some surrounding pelvic inflammation, which, by engorgement, exudation, and contraction, ultimately deform the organ."

This is a fair exposition of the pathology and treatment of anteflexion as understood in America at that time; and these are the teachings which our society gave forth to the world.

If the question were asked, Will we stand by them to-day? I would say that the teachings of 1888 must be considered erroneous. The views of our predecessors are not in accord with the views of to-day.

We now seldom treat "anteflexion." It is rare to find in our case-books a diagnosis of "anteflexion." Anteflexion, for the most part, is regarded as a normal condition, answerable, as a rule, for but little constitutional disturbance.

Anteflexion pessaries are regarded as useless, or as having no value except that which might attach to a retroversion pessary under the same circumstances.

The intrauterine stem which more than once has been praised, as it was in 1888, has passed out of the history of gynecology, perhaps forever, and will never again come into favor. The knowledge of pelvic inflammation is so fully disseminated that every practitioner must realize the peril to a woman from its use. No one better understood this than the essayist of 1888.

Sims's old operation is insufficient for the

purpose it was intended to fulfill. We have turned away from the treatment of the flexion, and have given attention to the associated pathological conditions.

So little interest is now felt in the subject, that it has been discussed but once in this society since 1888. To-day there is but one device for straightening the flexion; that is Dudley's operation, which is offered as a means of treatment for acquired or pathological anteflexion only.

The only recent investigations into the pathology of this affection are by Bland Sutton, who, in 1904, declared that "anteflexion is most often congenital; that the explanation of its ætiology in contraction of the utero-sacral ligaments is theoretical; and that this occurrence, if it takes place at all, is extremely rare."

We can therefore claim but little advance in knowledge here, unless it be in the recognition and acknowledgment of past errors.

The history of backward displacements, in like manner, presents perplexing problems not yet solved and illustrates my theme, which is to show with what difficulty we see and grasp the truth.

As you are aware, this subject comes up for discussion almost every year, and no agreement has yet been reached upon the methods of treatment proposed for its relief. At the very threshold we encounter difficulty, because we differ upon what constitutes the support of the uterus. A large majority of the gynecological writers of our time adopt the views of Dr. Frank P. Foster on this subject, or else some modification of them. According to this author, the supports of the uterus "ordinarily consist wholly of the anterior wall of the vagina in front, and the uterosacral ligaments behind, which together constitute a "beam" traversing the pelvis anteroposteriorly, on which the uterus rests." A like function is claimed for the broad ligaments, which act similarly as a transverse "beam." "These structures, taken together, act like the cables of a suspension bridge, which support the uterus in its center." (Skene.)

One of the popular authors of our time speaks of the ligaments as the means of suspension of the uterus; and still another, one of the most recent and influential, says: "The uterus is slung between the broad ligaments laterally, the round ligaments anteriorly, and the uterosacral posteriorly." An examination which I have made of eight of the text-books in use at the present day will justify the statement that these are the views commonly taught in regard to uterine supports. Six out of eight of these authorities accept these views.

When we consider the various operative procedures which have been devised for the cure of backward displacements, and note that nearly all of them involve the shortening of one set of ligaments or another, or else the suspension of the womb from above, we must conclude that the views I have quoted are in practice generally accepted by the profession.

On all sides, in the discussion of this subject the statement is made that the uterus is sustained almost entirely by its ligaments.

I respectfully submit that these teachings are erroneous. The proper supports of the womb are not the ligaments, but the various structures which constitute the two segments of the pelvic floor, as was demonstrated by Hart and Barbour in their *Manual*, and in the *Atlas of Female Pelvic Anatomy* in 1884.

Henry C. Coe emphasized these views in his article on the "Pelvic Floor," in *Mann's American System*, in 1887, and his declaration that "the firm attachment of the muscular diaphragm to the genitourinary organs is an important factor in the maintenance of their proper position" is the key-note to this question.

Dudley, in his *Gynecology*, has spoken to the point when he says: "The idea that the uterus is supported by the vaginal walls, or by the perineum, or by the uterine ligaments, is obsolete. The pelvic floor, as a whole, supports the uterus."

The round and uterosacral ligaments limit the movements of the uterus anteroposteriorly, the broad ligaments limit them laterally, and they all doubtless do contribute, though to a limited extent, to the support of the organ; but Hart and Barbour have shown that these ligaments should not be regarded as supports, the chief support of the uterus being the compact unbroken pelvic floor.

If it be asked what are the essential anatomical elements in this floor-structure, we encounter new questions which await solution.

Emmet taught that the rectovesical fascia attached to the sides of the rectum and vagina is the chief supporting structure of the pelvic floor. More recently, Professors Browning and E. C. Dudley have insisted upon the correc ness of this view. Others believe that the levator ani muscles, especially the fibers of the puborectales and pubococcygei, are the essential structures.

Dr. W. E. Studdiford, who has recently studied the anatomy of the pelvic floor, declares that the levator ani, especially its anterior portion, together with the sphincter ani, is the chief supporting structure. His dissections show that this muscle passes along the side of the vagina with which its fibers are united; sweeps backward in close relation with the external sphincter; is attached closely to the rectum; and, after surrounding its lower end, unites with its fellow of the opposite side.

In the space between vagina and rectum, he demonstrates a transverse and spindle-shaped band of involuntary muscle fibers closely attached to the levators. By the action of this muscular band, the two portions of the levator are drawn closer together, and the posterior portion of the vagina is drawn upward under the pubes.

According to the lights now before us, these statements seem to represent correctly the mechanism of uterine support.

If we exclude the congenital backward displacements, which are supposed to represent about twenty per cent of the whole number, the great bulk, or nearly seventy-five per cent, of the retroversions and flexions with which we have to deal have had their origin in childbirth and in the injuries to the pelvic floor consequent thereon.

In these cases, retroversion and descent are nearly coincident in point of time, and the problem most difficult of solution is, not how to correct the version, for this is easy, but how to maintain the uterus at its normal or physiological level in the pelvis. The real problem, therefore, in the treatment of backward displacements is how to repair the injury to the pelvic floor.

Hence it is that the numerous operations, vaginal and abdominal, proposed for shortening the ligaments have failed to give satisfaction, unless the pelvic floor is uninjured, and hence it is that no unanimity exists concerning the treatment of backward displacements.

When one reads a description of the various surgical procedures designed for the relief of these displacements — and their name is legion — he must turn away from their perusal with the feeling that they do not present a record of scientific progress.

In the average American woman who has borne children, there is found, with or without the perineal laceration, a relaxed pelvic floor which fails to support the womb, and for the relief of which no entirely or generally successful operation has yet been devised. It was for the relief of this class of cases that the fixation and suspension operations were proposed.

Ventrofixation is now rejected and seldom advised. Ventrosuspension, even when expertly performed, may eventuate as a fixation, and complicate labor to a dangerous degree. Hence it is hardly permissible in a child-bearing woman. It is, moreover, not a scientific procedure.

It is recognized here that each of the operations alluded to has its place, though with clearly defined and closely drawn limitations.

The operations for suspending the uterus from above, or for shortening the round ligaments, or vaginal fixation, cannot be regarded as imitations of natural conditions. They do not restore natural supports, and I think that in making use of them we are far from a solution of the problem.

Further progress in the treatment of this subject will probably come through an improvement in the method for repairing the injuries to the pelvic floor, rather than by devising new operations for swinging the womb from above.

Notwithstanding the admirable operation which Dr. Emmet has devised for repairing the perineum and bringing forward the posterior vaginal wall, it cannot be claimed that any practical measure has yet been established for repairing or suturing directly the torn muscles and fascia which enter into the pelvic diaphragm.

It should be observed that we are not yet

agreed upon the anatomy of the pelvic floor. We do not agree upon the exact nature of the injuries sustained by this floor in labor. How, then, can we be expected to agree at this time upon a method of repair?

The period at which we write, however, is full of hope for this subject, because of the anatomical and pathological work now being done.

It is remarkable that there should be, in the twentieth century, important differences among anatomists in their description of the levator ani muscle, and yet it is so.

Professor Browning's work is a valuable contribution to our knowledge of its anatomy.

Dr. Studdiford's frozen sections show that when injury to the pelvic floor occurs, it is the fibers of the transverse muscular band between vagina and rectum that are torn near their junction with the levator. The levators are then no longer bound together, the vagina cannot be drawn up under the symphysis, the sphincter ani sags down and backwards, and relaxation of the floor results. These sections indicate clearly where the sutures should be passed to bring the torn ends together.

Within a few years past, several methods have been proposed to bring accurately in apposition these torn muscles and fasciæ, of which the operations of Harris of Chicago, Noble of Atlanta, and Holden of Johns Hopkins Hospital are notable examples.

Since 1901, Dr. Coe has obtained satisfactory results in repairing these injuries by means of the circular buried suture suggested by Studdiford, which he says "does permanently reattach the torn fasciæ, and restores the parts to their normal condition." (Coe.)

It is needless to say the last word upon this subject has not been spoken.

It is in work along these lines, through a restoration of the pelvic floor, that I look for a solution of the problem — the successful treatment of backward displacements.

"Knowledge comes, but wisdom lingers."

Rawlinson, the historian of ancient Egypt, states that more than two thousand years ago, at Sais, on the Rosetta branch of the Nile, there was erected a temple to Neith, the Egyptian Athene, the embodiment of Truth and Wisdom. The figure of the goddess was veiled, and on her shrine was this inscription: "I am all that was, and is, and is to be; and no mortal hath lifted my veil."

To lift that veil, I may add, is our constant endeavor; but it will never be lifted — the truth never fully told.

Inasmuch as the whole truth may not be learned — since we cannot behold the goddess without her veil — these problems will never be all solved; and the future of this society, if we continue true to ourselves, and to each other as fellows, can be limited only by Time, which is everlasting.

Now, in conclusion, I beg to thank you for the great honor you have conferred in electing me to preside over your deliberations.

When you gave me the "white stone" a year ago, it was so unexpected that I had not words to express my thoughts; and even now I cannot tell how grateful I am for this mark of your esteem.

My feelings, however, remind me of something Pericles said to the Athenians in one of his orations: "And not riches, as some say, but honor, is the delight of men when they are old and useless!"

# VAGINAL CÆSAREAN SECTION[1]

By PROFESSOR DR. MED. DÜHRSSEN, Berlin

YOU have already heard such admirable papers on vaginal Cæsarean section read by Drs. Stamm, Fry of Washington, De Lee of Chicago, and others in your medical societies, that I may restrict myself to a few special points met with in my own experience and in that of other gynecologists, especially as I have dealt with the whole subject thoroughly in the recent text-book of von Winckel.

As far as the *name* is concerned, I myself have pointed out (1) that (although I did not know it till a few years ago) the name was used by Lauverjat in the eighteenth century. Thereupon van de Poll (2) went so far as to explain that Lauverjat had invented the operation, to which I had given the name of vaginal Cæsarean section. I can assure you that I had not read Lauverjat's work before 1906, when, after reading van de Poll's paper, I borrowed the book from the Royal Library in Berlin. Besides, it only follows from van de Poll's quotations from Lauverjat's book, that Lauverjat denoted *simply incisions in the margin of the os uteri* by the above-mentioned name, and that he recommended it in cases of imperfect dilatation of the os, but not of the whole cervix. The name "vaginal Cæsarean section" is old, but the operation itself is new (3). Also, as Stamm of Fremont, Ohio, (4) has described in detail, Acconci has no claim to the authorship of the operation, which I described first in the year 1895, in the form of "Anterior vaginal hysterotomy." In the year 1896 I carried it out successfully for mother and child in the from of anterior and posterior vaginal hysterotomy, and indeed also successfully in this sense, that the patient was delivered of a living child some years later by the help of metreurysis.

*By means of vaginal Cæsarean section and Gigli's hæbotomy, a problem of centuries has been solved; namely, the problem of how, without danger, to deliver the mother of a living child, in the presence of obstructions, through the soft and bony parts of the generative passage,* since neither of these operations has the dangers of the classical Cæsarean section nor of symphysiotomy. Both operations can be combined in one case, as, for instance, in the case of a patient with contracted pelvis, who is attacked with eclampsia before the dilatation of the os. The extremely simple subcutaneous hæbotomy is first performed, and then the vaginal Cæsarean section. In this way Henckel (*Centralblatt für Gynaekologie*, 1906) operated successfully on a case of placenta prævia with contracted pelvis. The combined operation is simpler and less dangerous than the classical Cæsarean section, because in it (not to mention the fear of infection present in any intraperitoneal operation) there is always the danger of the uterus tearing in subsequent deliveries. This danger is excluded in vaginal Cæsarean section. As a proof of this assertion, I can lay three photographs here before you, which show that the scar after a vaginal Cæsarean section is hardly visible. I had the opportunity of taking these photographs at a subsequent anterior colpocœliotomy.

Also, the eleven deliveries observed after vaginal Cæsarean section, contributed by Dührssen, Wennerström, Jerie, Stamm, Rühl, Liepmann (two cases observed by von Bardelben), Westphal (*Centralblatt für Gynaekologie*, 1906), ran an easy course, with one exception, which I will deal with later.

The fear of the disturbances in labor, as Findley of Chicago expresses it, is therefore without foundation. The remaining exceptions of this author, also, are not well founded.

I offer the following statements in rebuttal to his:

1. The delivery can be terminated in five minutes by the vaginal Cæsarean section.

2. The asepsis by the vaginal Cæsarean section can be brought about in just as exact a manner as by the classical method.

3. The incisions of the vaginal Cæsarean section do not tear further if the technique is carried out properly.

4. In only few instances is sterilization

[1] Read before the American Gynecological Society, Hot Springs, Virginia, May 24, 1906.

desirable The uterus can be removed from the vagina after a vaginal Cæsarean section as quickly as after an abdominal Cæsarean section.

5. With the proper technique, the child is not any more endangered by the vaginal Cæsarean section than by the classical method.

In regard to the *technique* of the operation — the details of which I presume are well known — the following points are of the greatest importance.

*The removing of obstructions on the part of a narrow and rigid vagina* by means of a vaginoperineal incision, which I first employed in 1887. The essence of this operation is the division of the levator ani. This auxiliary incision, in obstetrics as well as in gynecology (here especially for the vaginal extirpation of a carcinomatous uterus), is wrongly attributed to Schuchardt. I recommended it (also for the extirpation of carcinomatous uterus) three years before Schuchardt. In any case, as preparation for the vaginal Cæsarean section, the vaginal canal must be split to the extent of allowing the introduction of a powerful man's fist. The opening in the lower segment of the uterus must be enlarged to the same extent, and from this follows, in the case of full-time children, *the necessity of splitting the anterior and posterior wall of the uterus.*

It is, then, not necessary to draw down the upper part of the uterus with forceps, and by this troublesome operation run the risk of injuring the uterus or opening the peritoneum. By simple traction on the portio vaginalis one can survey for a distance of 6 cm. the whole region of the anterior and posterior walls which has to be incised. Besides, the incision of the anterior wall of uterus alone (the hysterotomia vaginalis anterior, as Bumm calls it) is is not an invention of Bumm, as some authors say, but only a modification of my method. I recommended theoretically the hysterotomia vaginalis anterior in 1895, and performed it in a case of eclampsia in 1900, i. e., two years before the first of Bumm's publications on vaginal Cæsarean section. In the case of full-time and especially of large children it gives, however, in my opinion, no sufficient dilatation for an easy extraction.

*Thirdly, the operation of delivery must be performed by turning*, not by forceps. If you go by these rules of mine, turning and extraction is as easy as the extraction of the child in the classical Cæsarean section. It is not right, therefore, to call vaginal Cæsarean section an accouchement forcé. Rather should we consider it, as von Winckel has done in his handbook, along with the classical Cæsarean section and Porro's operation. In the above-mentioned handbook the three operations are described in the chapter called "Extraction of the Child through an Artificial Opening." Even when there is an overextension of the lower uterine segments, turning is easy and without danger — as I observed it in a case of contracted pelvis — because by the double incision the dangerous tension of the lower uterine segment will be fully removed.

The *indications for vaginal Cæsarean section* may be summed up as follows: Vaginal Cæsarean section is indicated when, in the case of an imperfectly dilated cervix which will not permit of dilatation by gentler means, the life of the mother or the child is brought into danger. Also, the presence of an operator experienced in vaginal gynecological operations is required. The imperfect dilatation of the cervix can be caused by pathological changes in the neighborhood of the lower uterine segment, or danger to the mother and child may arise when the pains have as yet caused no sufficient opening of the os. In the first the case is that of an absolute, and in the second that of a relative, obstruction to delivery. The first must be removed because it will lead to danger for the mother and child; in the second, the danger is already present, and requires the immediate emptying of the uterus.

Among the special indications I next mention that of eclampsia. I first established the principle that on account of the undependable nature of eclampsia it was best, as soon as the diagnosis was established, to empty the uterus in brief but deep narcosis. The investigations of the last few years which have recognized eclampsia as an intoxication produced by pregnancy have shown that I was right, and proved that my demand was well established not only by its therapeutic success, but also on theoretical principles. I should like to urge that these theoretical investigations give us a reason for not confining ourselves to single convulsions

for the diagnosis of eclampsia; rather that we should form a diagnosis of a serious intoxication of the whole organism; for instance, in presence of coma without convulsions, or increasing eye symptoms or blindness, even with maintained consciousness and without convulsions. In these cases we must also undertake a rapid delivery. Even if we consider such cases as severe nephritis, and not as eclampsia without convulsions, their treatment is the same. I have, for instance, also performed vaginal Cæsarean section in a case where, obviously, the dislocation of a floating kidney caused by the pregnant uterus, and the consequent stoppage of the ureter, produced renal colic and albuminuria, and where, by reason of a scar of the internal os, metreurysis proved a failure.

In premature separation of a normally situated placenta, vaginal Cæsarean section is, as every one knows, the recognized operation. In placenta prævia, it is true, metreurysis with Champetier de Ribes bag is also a very good plan; still, consideration should be given to a case observed by Bumm in which fatal hemorrhage took place during the insertion of the bag.

On the other hand, the uterus wound, in vaginal Cæsarean section, with placenta prævia does not bleed more than usual. I therefore incline, in placenta prævia, to empty the uterus by incision, as was first recommended in America, and only recommend vaginal instead of the classical Cæsarean section.

In any case, vaginal Cæsarean section might be recommended for placenta prævia, where the cervix does not possess the sufficient dilatation and dilatability for the performance of metreurysis, or where, as, for instance, in the case of an old primipara or of a full-term child, a great deal depends on the saving of the child.

Once I performed vaginal Cæsarean section in a case of severe hemorrhages, which were caused by missed abortion, with seven months' retention of the dead fœtus. In spite of tamponade of the uterus and the employment of laminaria, the rigid cervix was not dilated, and the very severe pains produced by these means could not detach the firmly adherent placenta. After incision of the anterior wall of the cervix, it was easily possible to detach the mole with two fingers. In the mole there was still the mummified fœtus.

Through vaginal Cæsarean section, the classical operation on the dying has, according to my view, lost its right to existence. The first should be performed at once, and by this promptitude the mother may often be saved, while in the classical Cæsarean section the waiting on unmistakable signs of approaching death often causes the loss of the child's life.

Vaginal Cæsarean section will further limit another method of mine, i. e., deep incisions which I recommended in cases of imperfect dilatation of the vaginal part of the cervix. Lack of success with this method has frightened many away from it, and has driven them to use Bossi's instrument, but the mishaps are caused by want of attention to the rules I have given in detail, particularly that of carrying four incisions as far as the insertion of the vagina to the cervix. Any one who is afraid of these four incisions tearing further can turn with safety to the vaginal Cæsarean section. With a dilated supravaginal part of the cervix it is extremely easy to proceed as follows: The posterior lip should be first split, if it can be reached, and then the anterior, in a sagittal direction. This last cut should be continued up to the anterior fornix, and then by means of a small speculum, or simply by pressure of the fingers, the anterior uterine wall can be exposed for a distance of some centimeters and split. If the head is fixed, the forceps can be used; if movable, it is better to turn.

The danger of vaginal Cæsarean section is not greater than that of any other obstetrical operation. Indeed, I believe I may safely assert that it is less than that of a forceps or a perforation operation in cases of imperfectly dilated soft parts. In these operations a great many injuries take place from tearing and crushing, which have a greater disposition towards septic or pyæmic infection than the smooth incision wounds of the vaginal Cæsarean section, and leave unpleasant scars behind. If you look at the narrow scars on the anterior and posterior lip in Fig. 5, you will confess that many a normal delivery leaves much greater deformities of the portio vaginalis. When I keep before me all the advantages of vaginal Cæsarean section, I see (in hospital

practice) the opportunities of application of mechanical dilatation becoming fewer.

Bossi's method I repudiate entirely. In cases of closed cervix it is dangerous, and in cases of dilatation of the supravaginal part of the cervix it is unnecessary, because delivery can be more rapidly performed by deep cervical incisions or by vaginal Cæsarean section. Bossi's method leads not only directly, but indirectly, to tears which may be dangerous to life, for Staude (5) reports a case lately, in which, after application of the Bossi, the scars led, in the next labor, to a fatal rupture of the uterus.

One of the nine deliveries after vaginal Cæsarean section demonstrated its superiority over the Bossi method and the metreurysis. In this case, Rühl (6) performed vaginal Cæsarean section on the 21st of January, 1904, on account of fever, and because the rigid cervix would admit only one finger, and was not dilated by eight hours' metreurysis with self-acting traction. In the next delivery in 1905, the cervix was again dilated very slowly. Finally, Bossi's instrument was used, when the cervix admitted three fingers. But already, after a dilatation of 8 cm. a violent hemorrhage occurred, which could only be stopped by turning and extraction. The head was, however, retained, and could only be extracted by means of incisions in the cervix, which was drawn down into the vulva. Tamponade of the uterus; recovery; child living.

As the author rightly remarks, the rigidity which required vaginal Cæsarean section in the first delivery was present also in the second delivery, so that the second difficult delivery is not to be regarded as a consequence of the vaginal Cæsarean section. Rühl would have done better in this case if he had repeated the vaginal Cæsarean section. Finally, the delivery had to be effected by incisions in the cervix, while the Bossi method was a complete failure.

Metreurysis, which since 1893 I have popularized in Germany, is an excellent and safe method, looked at only from the point of view of dilatation. This is so only in cases when one can wait a few hours for the delivery, and when the constant self-acting traction advised by me is practised, and in cases where no essential pathological changes in the cervix are present. Its danger, however, lies in the introduction of a foreign body, and Döderlein called attention to this at the congress of the German Gynecological Society at Kiel in 1905. He says: "It becomes covered with germs in a few hours, and thus becomes an incubator for micro-organisms, which become dangerous when pathogenic micro-organisms are found among them, or when this septic focus is allowed to remain in position a long time."

I also have observed slight rises of temperature in metreurysis, as well as the discharge of a bad-smelling ichorous fluid on removing the bag, although the cases were treated in my hospital with all aseptic precautions. It is therefore a question whether one should expose women to this danger in a hospital or not, rather than perform vaginal Cæsarean section.

For the general practitioner, however, metreurysis is a priceless method, and if a doctor has no Champetier de Ribes bag in his instrumentarium already, I advise him to procure one immediately, and to make room for it by removing Bossi's instrument.

A method of mechanical dilatation which is good, and also easy of application for the general practitioner, may be used in the first seven months of pregnancy and in cases in which there is no hurry. It consists in tightly plugging the whole uterovaginal canal, as has also been described by me. The cavity of the uterus is plugged with iodoform gauze and the upper half of the vagina with salicylic wool. To strengthen the action, a laminaria tent can be inserted in the cervix. The action is sometimes so explosive that in from twelve to twenty-four hours the whole contents of the uterus will be ejected as far as the vulva, and at any rate the cervical canal will be so dilated in this time that the uterus can be comfortably emptied.

Since 1892 I have had various tin boxes manufactured for the different kinds of plugging material. Most German obstetricians have Dührssen's germ-free boxes (Nos. 1 and 2) in their midwifery bags. For subsequent plugging after vaginal Cæsarean section, box No. 1 is absolutely necessary. To be sure, we can decrease the frequency of atonic hemorrhage if we inject ergotine before the beginning of the operation.

Modern obstetrics does not only claim from the doctor that he shall in the first place save the mother and then the child, but rather both. I stood out for this already in the first edition of my *Obstetrical Vade Mecum* (1890), and I am glad to be able to show that Dr. Brothers's (7) (New York) prize essay, which appeared in 1896, is written in the same spirit.

Nowadays it is not justifiable to let a living child die because the soft parts of the generative passage are not sufficiently dilated for its extraction, nor indeed to use forcible extraction, for, in consequence, the child often enough dies, or is badly injured for its after-life, and further, the mother runs the risk of dangerous lacerations of the uterus and vagina.

Further, it is not justifiable to undertake the delivery of a woman with a normal or only slightly contracted pelvis by means of perforation of a live child, or by the classical Cæsarean section, because the cervix is imperfectly dilated.

*In all these cases vaginal Cæsarean section can take the place of simply waiting, of rougher and more dangerous methods, or of the conscious destruction of a being capable of life.*

I have collected 376 cases of vaginal Cæsarean sections with 48 deaths (12.7 per cent). This high mortality is not due to the dangers of the operation, but to the serious diseases on account of which the operation was undertaken. This proves the fact that the greater operation, namely, the radical vaginal Cæsarean section, has a lower mortality than the conservative vaginal Cæsarean section. Of 53 cases of extirpations of the uterus after vaginal Cæsarean section — this combination of operations I name radical vaginal Cæsarean section — only 5 died (9.4 per cent). This further proves the low mortality of the conservative vaginal Cæsarean section in clinics, where immediate deliveries in cases of eclampsia have been effected according to my teachings and directions. Veit, for instance, had only one death in 33 cases; Bumm, only 1 death in his last 40 cases; as Bumm's assistant, Dr. Liepmann (8), kindly told me.

My own statistics strengthen the principle, that cases of death occur, not because of, but in spite of vaginal Cæsarean section. I have to complain of 2 deaths in 12 cases of vaginal Cæsarean section. One was a woman moribund with heart disease. She died immediately on the uterus being emptied. The other was a case of eclampsia with pulmonary tuberculosis; she was first cured of the eclampsia, the wound healed perfectly, and the uterus was completely involuted, but she died in four weeks, of tubercular pneumonia.

American obstetricians have taken up the idea of vaginal Cæsarean section with that open receptivity for every advance which characterizes the American people. I feel bound to express my warmest thanks to my colleagues, who, through their operations and their literary ability, have done the work of pioneers in this country, especially to Dr. Stamm of Fremont, Ohio, Bacon of Chicago, Carstens of Detroit, Webster of Chicago, Miller of New Orleans, Peterson of Ann Arbor, Fry of Washington, Goffe of New York, Stone of New York, Ewald of New York, De Lee of Chicago. Not only my thanks are due to them, however, but the thanks of the whole world, and of generations yet to come.

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# MANUAL DILATATION OF THE CERVIX OF GRAVID UTERUS[1]

By PHILANDER A. HARRIS, M. D., Paterson, New Jersey

FOR a year and a half I have, for elective delivery, dilated all parturient uteri with a uterine dilator which I will show you, and which measures the force applied to the cervical ring. I have also used this dilator to enlarge the cervix in almost every operation for incomplete abortion and for curettement.

I had not gone very far in the employment of this dynamometric dilator for general use, until I found that the cervices of uteri which were gravid, or which had recently been gravid, possessed the quality of dilatability in a very far greater degree than the cervices of uteri which were not gravid, or which had not recently been gravid. As I proceeded further in the employment of this force-measuring dilator, I not only became assured of the correctness of earlier impressions, but I found that most uteri which were not gravid, and had not been so for a year or longer, had little or none of the quality of dilatability. In most of these a strain of twenty to thirty pounds upon the cervix effected comparatively little or no enlargement of the cervical ring, even when maintained for fifteen minutes or more.

Occasionally a non-gravid cervix would slightly lacerate under this heavy strain, but it would not dilate; so I am now inclined to believe that most uteri which have not been gravid within six months or a year, enlarge *so slowly* under a heavy tonic strain that they should be classed as undilatable. If my assertions in this relation are confirmed by others, then the term "dilatation of the cervix," as we have applied it to this class of cases, is largely a misnomer, and we may henceforth have to admit that many of our so-called rapid dilatations of the cervix in the non-gravid were but lacerations or divulsions.

So differently does the gravid and non-gravid cervix uteri ordinarily behave when subjected to the strain of a dynamometric dilator, that the experienced operator can shortly judge whether the uterus is or has recently been the seat of pregnancy. From experience thus gained I am convinced that any gravid uterus which is not cancerous, which is free from a neoplasm or an excess of white fibrous tissue, can, in an average time of one hour or less, be safely dilated to a size which will allow the head of the fœtus or child to escape therethrough, whether the gestation has advanced far enough for the child to be viable or not.

When the uterus becomes gravid, certain changes occur in it; nature begins to prepare the cervix for its tasks. One of these tasks is to close distinctly the doorway from the uterus to the outside world; but, while it thus guards the doorway, it prepares the gates to open the right of way to the fœtus or child, when transit becomes necessary. This latter quality of dilatation of the cervix of the gravid uterus is the particular physiological item to which I would direct your especial attention. This quality is but what we should have expected of nature.

If these assertions regarding the ordinary behavior of the gravid and parturient uterus are correct, — and I feel sure you must all be inclined to believe that they are, — then it becomes our duty to take advantage of our knowledge in this relation, and when nature fails to dilate the cervix, or is not ready to act when action is required, we should avail ourselves of those means which are efficient, and to which nature has naturally prepared the cervix to yield.

In speaking of manual dilatation of the cervix for obstetrical purposes, I wish to be distinctly understood as referring to a method which I have employed for the past twenty-two years, and I would exclude other manual methods, unless such methods are as safe, as rapid, and as certain in effect as that which I have used.

The method of effecting manual dilatation which I have employed was first publicly described by me in a paper read at the Pan-American Medical Congress in 1893.

Undoubtedly as a result of an imperfect description of my technique, comparatively

[1] Read before the American Gynecological Society, Hot Springs, Virginia, May 24, 1906.

few physicians familiarized themselves with the method. A few are known by me to have clearly understood the method, and to have since employed it. By its employment, such have so much success in dilating the cervix, that I do not now find them grouped among the class of obstetricians who are still looking for some safe and sure method of quickly effecting elective delivery.

By the method which I have employed I am convinced that a far greater tonic strain can be applied upon the musculature of the cervical ring than by any other manual method. I am also convinced that it is far less fatiguing than other manual methods. This method relies mainly upon the flexor muscles of the fingers and thumb. These are by far the strongest of the hand, and therefore best fitted to exert and sustain powerful tonic strain.

The growth of cancer in the cervix renders it undilatable. A cervix which has been partly cut away, amputated, and sewn, or resewn, may contain so much white fibrous tissue that it is rendered undilatable. These are conditions which I would especially mention as liable to render either physiological, manual, or instrumental dilatation a failure. For such cases incision by knife or scissors alone will succeed in opening the downward right of way for the birth of the child.

I believe that the average time required to dilate safely and manually the cervical ring to a circumference of eleven or twelve inches should be forty-five minutes, provided the first finger can be easily introduced into the cervix to the metacarpo-phalangeal knuckle at the beginning of manual dilatation.

If the cervix is not effaced, a metallic dilator or rubber bag is required to dilate it sufficiently to allow the full introduction of the index finger. In such cases I believe that the average time of ninety minutes would be necessary to instrumentally, manually, and safely dilate the cervical ring to a circumference of eleven or twelve inches. Rubber bags and balloons are too slow and too uncertain in their action to be used in operation.

The surgeon whose hand is weak or crippled will dilate the cervical ring very imperfectly, if at all. A vagina which will not permit of the introduction of the entire hand contra-indicates the employment of this method. The hand itself while in action occupies a perfectly passive position in the vagina. The fingers which effect the dilatation neither push the uterus particularly upward, nor do they draw it downward, nor do the fingers project much within the uterine cavity. In about one hundred manual dilatations I have never accidentally ruptured the membranes while effecting dilatation.

Non-effacement of the cervix is not a contra-indication to manual dilatation, provided the operator has an instrument to make the cervix large enough for the full introduction of the index finger. The very greatest force is required in the beginning of dilatation. As the cervical ring grows larger, less and less force is required. The operator should constantly study the advancement of time, exercising much patience while performing this task. The tendency is to hurry, and consequently to exert too much force, whereby laceration, and consequently unnecessary bleeding, may occur.

The special advantage in knowing a good method to dilate manually the cervix is, that the operator always has his hands with him, and if they are strong ones, he will scarcely ever fail to dilate the cervix if he properly employs them.

The disadvantages of the method are, the fatigue incident to the task, the frequent changing of hands from left to right, and from right to left, and the liability of carrying septic matter into the uterus.

Now and then the vagina of a primipara but six and a half or seven months advanced in gestation will be found too small to admit the hand without laceration of the perineum and possibly the vagina. I have met with two such cases.

The chief items in the technique of manual dilatation, as I employ it, are about as follows:

General and complete anæsthesia.

Washing the rectum until the reflow is quite clear.

Washing and sterilization of the field of operation and its outlying borders.

If the cervix is not effaced, it is dilated with a Goodell or other steel dilator until it admits the first finger and the tip of the thumb.

A rubber glove is placed upon one hand,

and sterile soapsuds poured upon it as a lubricant.

An assistant or nurse presses a folded napkin upon the perineum between the vagina and anus. This napkin should not be pressed upon the anus. It should be held against and across the perineum so that it will hang loosely from that point, and form an apron to cover the rectum, so that any evacuation of the rectum during operation will fall downward, away from the vagina.

Introduce the hand in the vagina.

Introduce the tips of the index finger and thumb into the cervix.

With the tip of the thumb and finger within the cervical ring, the index finger is flexed, while the thumb is extended upon it.

Very hard and long-continued flexure of the index finger and extension of the thumb is required to carry forth dilatation. I do not think that the index finger and thumb of the strongest hand can exert sufficient pressure to lacerate the cervix at this stage, so that the operator may now, without fear of lacerating the cervix, exert as heavy a tonic strain upon the cervical ring as the strength of his hand is capable of effecting.

When the first hand fatigues, it is withdrawn for rest. The other hand is gloved, soaped, introduced, and the tonic strain on the cervical ring renewed. When the second hand fatigues, it is withdrawn, and the first hand covered with a freshly sterilized glove and reintroduced.

In a space of time varying from five to twenty minutes or longer, the cervix will be found to have yielded sufficiently to permit of the introduction of the tips of *two* fingers and the thumb.

In the employment of two fingers and the thumb, two distinct maneuvers are possible, and they are of about equal value.

One of these movements consists in flexing the two fingers, while the thumb is extended and resting upon the index finger.

The other consists in holding the first finger in a partly extended position upon the end of the straightened thumb, while the flexure of the second finger exerts strain upon the cervical ring. The natural limit of dilatation with two fingers and thumb is about six inches (circumferential measurement).

When the cervix will admit the tips of three fingers and the thumb, the flexure of the second finger receives the uterine ring at one side, while the first finger held in partial extension on the tip of the thumb, or the thumb resting upon the first finger, furnishes a plain or sulcus to receive the other side of the cervical ring. The natural limit of dilatation with three fingers and the thumb is a little over seven inches.

When the cervical ring is enlarged to admit the tip of three fingers and the thumb, any fairly strong hand can exert sufficient power to tear most uteri. Consequently, as dilatation advances, the operator with a strong hand must not exert nearly all the force at his command.

Having enlarged the ring as much as possible with the thumb and three fingers, all fingers and the thumb are now introduced within the cervical ring. The flexure of the little, ring, and middle finger now exerts a strain upon one side of the cervical ring, while the first finger held in extension upon the tip of the thumb affords a plain upon which the other side of the cervical ring is held. The limit of enlargement in this position of the hand is from nine to ten inches.

Further dilatation of the cervical ring is easily and naturally effected by expanding the fist in such manner as to balance the uterine ring upon its outer planes and sulci.

When the hand is now withdrawn from the uterus, the bag of waters follows, helping to fill the vagina. It should, of course, not be broken until the operator has decided whether he will deliver head or feet first. If version is required, he must not rupture the membranes until he is in every way prepared to effect the version. When the cervix is believed to have dilated sufficiently to offer no particular impedient to the transit of the larger diameter of the child, anæsthesia is withdrawn, but the strain upon the cervix continued. So soon as sensibility begins to return, the membranes are broken, and the child immediately turned, unless it has been decided to allow the presenting parts to engage and come first. As the patient recovers from the anæsthesia, uterine contractions and labor pains will assist, if they do not almost unaided expel the child and other uterine contents.

The hand in effecting dilatation does not push the uterus upward, nor does it pull it particularly downward.

Sterile soapsuds is the lubricant which I prefer and generally employ.

Just before the uterus is fully dilated, the anæsthetic is withdrawn, in order that the patient may have uterine contractions and pains to expel the child.

Spasmodic jerks or momentary outthrusts of digital strength should be avoided.

A clean sterile glove should be placed on the hand as often as it is introduced. When the tonic strain upon the cervical ring is being properly exerted, the fist of the working hand itself occupies a perfectly passive position in the cervix.

In purely elective delivery the average time for performing manual dilatation of the cervix should be fifty minutes.

Some cervices can be dilated to a circumference of ten or twelve inches in twenty or thirty minutes, while others will require an hour and a half. If at any stage in the task of dilatation the operator finds the cervical ring suddenly yielding, he is entitled to the presumption that he has unintentionally lacerated it.

When the cervix is fully dilated, the bag of membranes pouches from the cervix when the hand is withdrawn from the vagina.

Normal salt solution should be frequently poured over the vulva and the introduced hand. Gravity flow will carry everything downward, and away from the vagina.

As equable a strain as possible should be maintained upon the cervical ring.

About all the force possible is used until three fingers can be introduced. After that a tonic strain with gradually diminishing force must be maintained.

When all the fingers and thumb can be introduced, any strong hand is capable of exerting too much, and possibly dangerous, force.

The operator should maintain a strong but tonic strain and watch the clock, not for the purpose of seeing how quickly the work can be completed, but rather to lead to the exertion of less force, and consequently more tardiness in effecting dilatation.

## DILATATION OF THE CERVIX UTERI WITH THE DYNAMOMETRIC DILATOR

Two years ago I presented to this society, at its meeting in Boston, the first model of an obstetrical dilator. Since then I have used the dilator not only for obstetrical purposes, but for dilating the cervix in almost all cases of incomplete abortion, and also of ordinary curettement. Although the dilator has been altered, it contains nothing which was not in mind when the instrument was last shown you. Very much use of the instrument has led to the elimination of defects in the earlier designs, and I now feel that it possesses much value.

The instrument is provided with two pairs of detachable terminals, a large and a small. Either pair may be used to begin the dilatation when the cervix is not already effaced. The instrument is provided with a strong spring, which is compressed with a finger-nut, and through which resistance is transmitted to the levers and their uterine terminals. A dial at the proximal end of the instrument registers

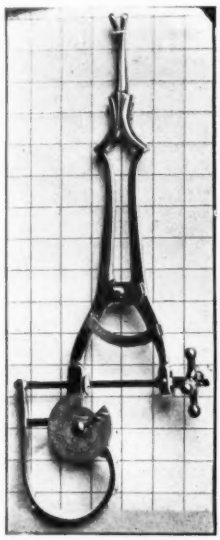

Fig. 1. Shows the author's dilator, with the extension or detachable terminals attached to the ordinary terminals. (The vertical and horizontal lines which appear in these figures are one inch apart, and are intended to afford the reader an opportunity of measuring the length and breadth of the instrument, or any part of it.)

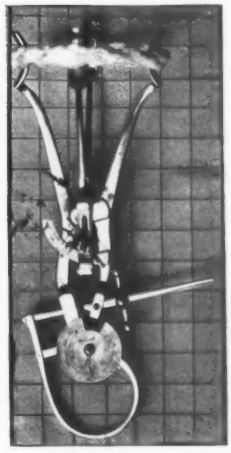

Fig. 2. Shows all four levers in position for the extreme limit of dilatation. A soft rope riding in the concavities of the terminals indicates the relation of the cervical ring to the levers or blades of the instrument. Upon these four levers the cervical ring may be dilated to a circumference of twelve inches.

in pounds the amount of strain exerted on the cervical ring. This dial has a double register. The longer finger, terminating at the outer circle, records the strain thrown upon the *detachable* terminals, while the shorter finger, terminating at the inner circle, registers the strain upon the cervix when the instrument is used without the detachable terminals.

So far as I know, this is the first uterine dilator to be provided with a dynamometer. To distinguish it from dilators which *do not* measure the strain exerted, I have termed it a dynamometric dilator.

By means of a finger-screw to the right of the proximal end of the instrument, any strain from one to thirty-five pounds can be transmitted through the spring and levers to the cervical ring. The resistance of so powerful a spring in compression would make the instrument a most dangerous one, were it not provided with means whereby the natural recoil of the spring, in the event of beginning laceration or divulsion of the cervix, is prevented.

This contingency has been provided for by the addition of a safety-nut. By keeping the safety-nut in proper position, the recoil of the spring is arrested in the event of either tearing or too rapid dilatation. In other words, when *necessary* or when *important*, the safety-nut instantly disenergizes the instrument, so that extensive tearing or divulsion should not result from a careful use of the instrument.

In order that the amount of dilatation acquired by either the ordinary terminals or the detachable terminals may be known to the operator, the instrument is provided with a double mensurating register. From this register the operator may read the exact circumference of the lumen of the os or cervix uteri up to nine inches. To effect a greater dilatation, the two additional blades are inserted, and the terminals separated by means of a thumb-screw. The employment of four instead of two levers does not impair the dynamometric quality of the instrument. It registers the strain upon the cervical ring quite as accurately when four levers are employed for dilatation as when only two are in action.

Unlike most other uterine dilators, this instrument is made up of many distinct and detachable parts, and at operation the parts are introduced piecemeal, or the instrument is built up, as it were, in the patient. By such construction, the terminals or blades many be introduced in much smaller lumen than instruments which are permanently fixed at their fulcri. When the blades of my instrument are placed within the uterus, they form either two or four substantial concavities, from which the cervical ring is not much inclined to escape in either an upward or downward direction. Dilatation is always started upon the terminals of the two blades.

When the lumen of the cervix has attained a circumference of five or six inches, it is recommended that the two supplementary blades be added. From that time the uterine ring is, of course, dilated by the employment of four instead of two terminals, and the uterine ring assumes a quadrangular form. When only two blades are introduced, it, of course, takes a rectangular form.

The patient is placed upon her back, with the buttocks slightly overhanging the delivery-table, with the knees flexed upon the abdomen; the perineum is depressed with a Sims speculum; the cervix drawn down to view with a hook or volsella forceps, and the left or dial

blade introduced. Having placed its terminal into the uterus to the hilt, the right blade is introduced and set upon its fulcrum. The long bolt is then passed through the proximal end of the dial blade, the saftey-nut is spun part way down it, the point of the bolt is passed through the oscilating cylinder of the right blade, while the left end of the bolt is caught upon the spring. The four-knobbed finger-nut is then screwed down upon the oscillating cylinder of the right blade. Force is thus exerted upon this spring and the strain is transmitted to the terminals within the cervical ring. The dial will now show the number of pounds of strain upon the cervical ring, while on the crescent may be read the circumferential measurement of the lumen of the cervical ring.

If the cervix is not effaced, the large pair of detachable terminals can, after the seventh month, generally be introduced without trouble. If the cervix will not admit the larger detachable terminals, the smaller and rather shorter detachable terminals may be used instead. It must be understood that all dilatations are performed under complete general anæsthesia.

After the seventh month, and until term, I have generally found that a strain of at least twenty pounds is required to begin and carry forward dilatation of the uneffaced cervix. If with the first tests of ten or fifteen pounds the ring is found to be yielding, no greater force should be required. If within five minutes neither the register of inches nor the register of pounds indicates any dilatation, five pounds more should be tried for four or five minutes. If the cervix does not slightly but steadily dilate with that strain, the force may be increased by five pounds. It must be remembered, however, that whether much or little force is being applied, the safety or disenergizing nut must constantly be kept very closely to but not against the left or dial blade of the instrument.

As the cervical ring dilates, the safety-nut must be steadily unscrewed. If attention is not paid to this safety-nut, and it becomes entrapped upon the dial blade, it will at once arrest the spring, and the strain upon the cervix will be instantly less, and in a few minutes be reduced to zero.

As stated above, when the effaced cervix has attained a circumference of five and a half to seven inches, both blades of the instrument should be removed from the patient, the detachable terminals abandoned, and the instrument reintroduced in such manner that the cervical ring will ride upon its ordinary terminals. The long compression-bolt with its safety-nut is reset, and the force reapplied by means of this four-knobbed finger-nut. When the register upon the crescent indicates a circumference of eight inches or possibly nine inches, according to the width of the pelvis, introduce the two supplementary blades, and tighten them with their short bolt and the thumb-screw. At this point I generally unscrew the four-knobbed finger-bolt, and tighten the thumb-nut of the shorter bolt, which corrects the short levers. In so doing, however, it must be remembered that the finger of the dial must at no time be allowed to run back to zero. If a strain of at least a few pounds is not maintained on the cervical ring, there is some liability of disengaging the instrument from the cervical ring. The detachable terminals have a slight pelvic curve, but these are the only parts of the levers which have a curve to adapt it to the form of the pelvis. My first instrument was made without a pelvic curve, and I found that a pelvic curve is not at all necessary, except when the detachable terminals are employed. In using a straight dilator one has but to press down slightly against the perineum, and to push the instrument slightly upward to avoid dislodgement of the cervical ring from the tips of the terminals.

The instrument need not be removed and reintroduced, unless the cervix is so small when beginning dilatation that the detachable terminals are required. In this event the two blades must of course be withdrawn for the purpose of reintroduction without the detachable terminals, but this should not be done until an enlargement of 6 or 7 inches is effected.

Some of the advantages of dilatation as accomplished by this instrument are as follows:

It is not fatiguing to the operator.

It affords any degree of strain upon the cervix which may be desired.

It is provided with a dynamometer which shows not only the number of pounds pressure which is being exerted upon the cervical ring,

but it also shows whether the ring is dilating under the pressure.

The instrument has a safety device whereby the instrument is disenergized the moment either too rapid dilatation or laceration occurs. Extensive laceration cannot occur if the instrument is properly used.

Serious laceration should not happen, except from impatient and unskillful operators.

The instrument is made of steel, and can be sterilized.

Any pregnant woman in any stage of gestation may be placed upon the operating-table, and an elective delivery effected in an hour or so without any previous preparation.

*Disadvantages.* No one should use it who has not previously and well studied its behavior.

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# SHORTENING OF THE ROUND LIGAMENTS WITHIN THE INGUINAL CANALS THROUGH A SINGLE SUPRAPUBIC TRANSVERSE OR MEDIAN LONGITUDINAL INCISION[1]

By REUBEN PETERSON, M. D.

Professor of Obstetrics and Gynecology, University of Michigan, Ann Arbor

I DESIRE to call your attention to a method of shortening the round ligaments, which I have employed during the last year in a considerable number of cases. For aught I know, others may have used the same method. I am not seeking to claim priority for the operation, although, as far as I am concerned, it is original, for I have not read of or seen a similar technique.

Alexander's operation of shortening the

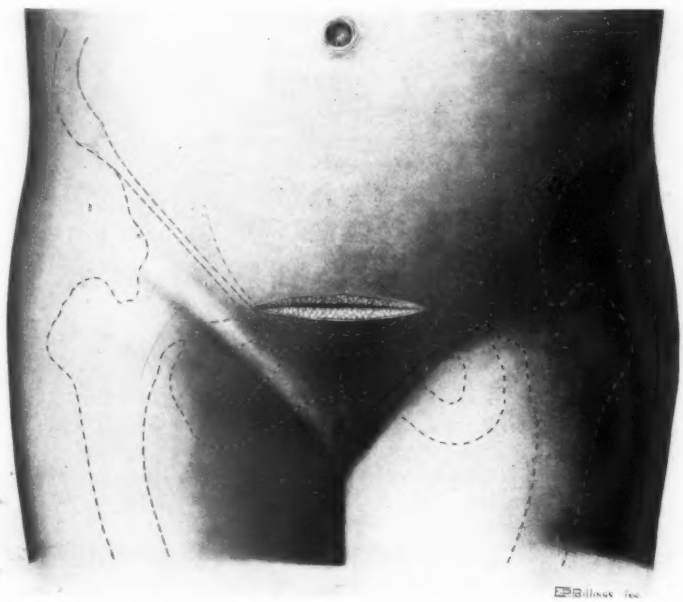

Fig. 1. Surgical landmarks and transverse incision. Latter should be made slightly above imaginary line uniting the spines of the pubes. For the ordinary case, an incision 2½ inches in length will suffice.

[1] Read before the American Gynecological Society, Hot Springs, Virginia, May 24, 1906.

round ligaments within the inguinal canals for the relief of backward displacements of the uterus, has always been a favorite with me. In properly selected cases there are fewer relapses than with other operations devised for the same purpose. And this statement is made deliberately, after a careful trial of nearly all the principal operations of this class, together with a great many modifications which have been brought forward during the past fifteen years. After this operation there is rarely any of those disagreeable, dragging pains in and about the bladder which too often follow other retrodisplacement operations. The principle of the operation has always appealed to me. It is not an attempt to support the uterus by the formation of new ligaments, but the fundus is held forward by shortening already existing ligaments. It can stand the test of future pregnancies, as shown by numerous cases of my own, as well as the testimony of other operators. Still, in spite of its merits, Alexander's operation has its disadvantages, which may be briefly stated as follow:

1. The operation is limited in its scope, since it must be reserved for perfectly movable, non-adherent uteri. This is a serious disadvantage, since, besides limiting the operation to a comparatively few cases, it opens the way to failure should adhesions be overlooked prior to the operation. Every operator must admit such mistakes in diagnosis. Fine adhesions about the appendages and posterior part of uterus and rectum sometimes escape the most expert examiner. They do not prevent the reposition of the uterus, but they exert a strain in the opposite direction when the uterus is held forward by the shortened ligaments. Pain and discomfort, and not relief of the symptoms, are the result.

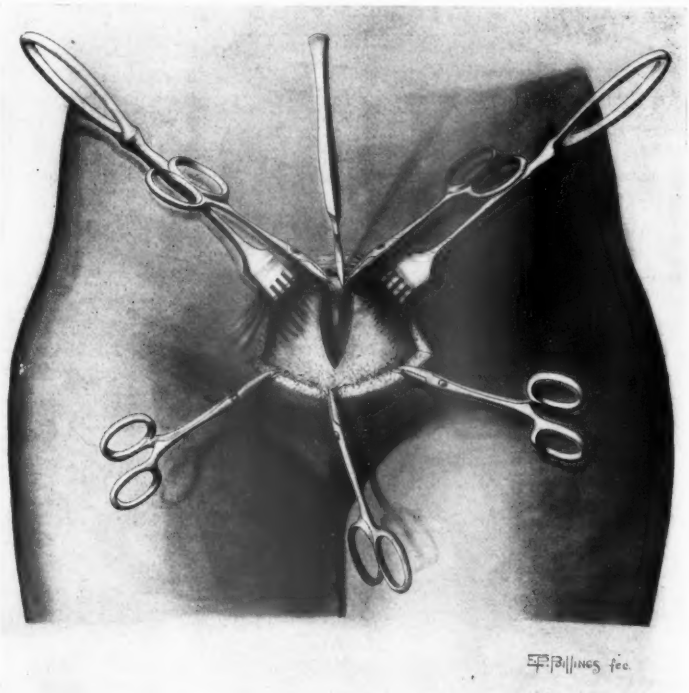


Fig. 2. Exposure of fascia and carrying upward of one edge of transverse incision. Longitudinal incision 1½ inches in length in fascia. Shows separation of muscles and method of opening peritoneal cavity.

2. Each ligament has to be shortened by a separate incision in the inguinal region. Hence there is a double chance for suppuration. Because of the location of the incision and its liability to contamination, there is more of a tendency to suppuration after Alexander's operation than after other procedures. This has been testified to by many operators, and is borne out by my own experience. That it must be due to the location of the skin incision, is shown by the marked improvement since the present technique has been adopted, although essentially the same method is employed for isolating and suturing the ligament.

3. Alexander's operation cannot be used as an adjunct to other intrapelvic work, since it would necessitate three skin incisions, which, for obvious reasons, cannot be considered.

In the operation here submitted for your consideration an attempt has been made:

1. To develop a technique which shall be applicable to all cases of uterine displacement requiring relief by an operative procedure.

2. To perform the work through one incision.

A considerable experience with the transverse incision for intrapelvic work led me to try this incision first. I was surprised to find how easily the external inguinal rings could be uncovered by a transverse incision, less than three inches in length. The remainder of the technique has been developed step by step, and is as follows:

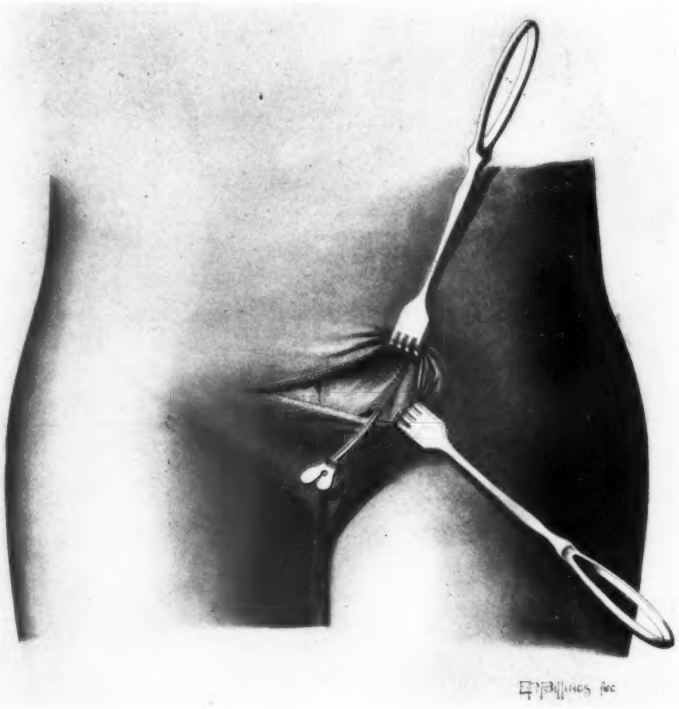

Fig. 3. Showing method of exposure of external inguinal ring, which is situated always at the base of the spine of the pubes. Insertion of grooved director.

*Technique of Operation.* With the patient in a moderate Trendelenburg position, the spines of the pubes are located by the thumb and forefinger of the left hand. A transverse incision is made through the suprapubic fat down to the fascia, slightly above an imaginary line joining these two points. (Fig. 1.) The

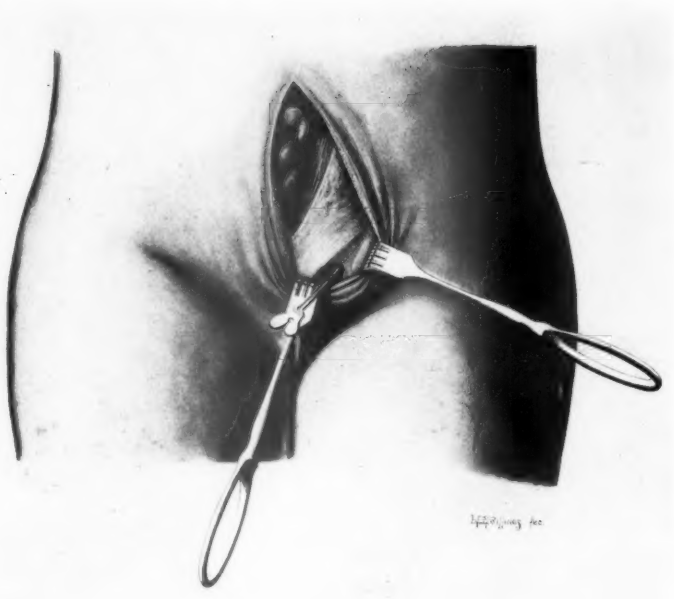

Fig. 4. Showing method of exposure of external inguinal ring when longitudinal median incision is employed.

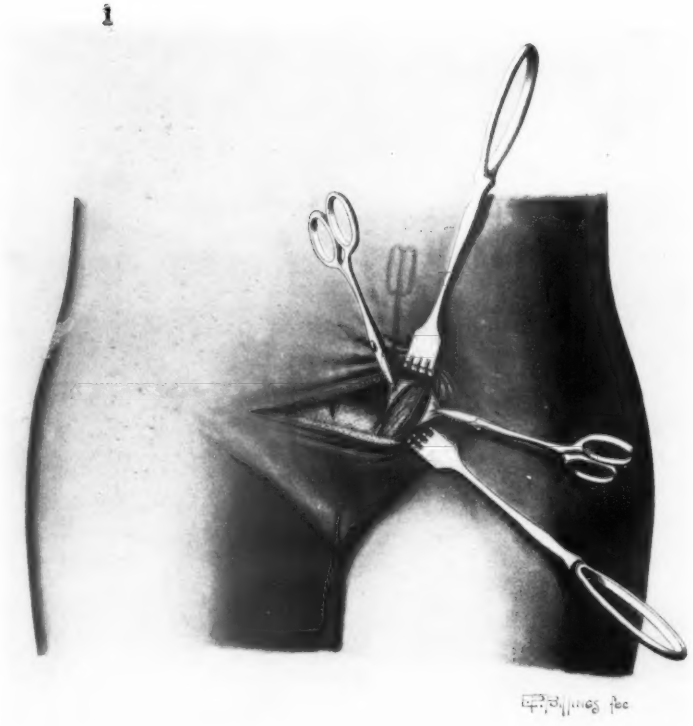

Fig. 5. Fascia split upward for about 1 1/4 inches. Contents of inguinal canal exposed. Isolation of genital branch of the genitocrural nerve.

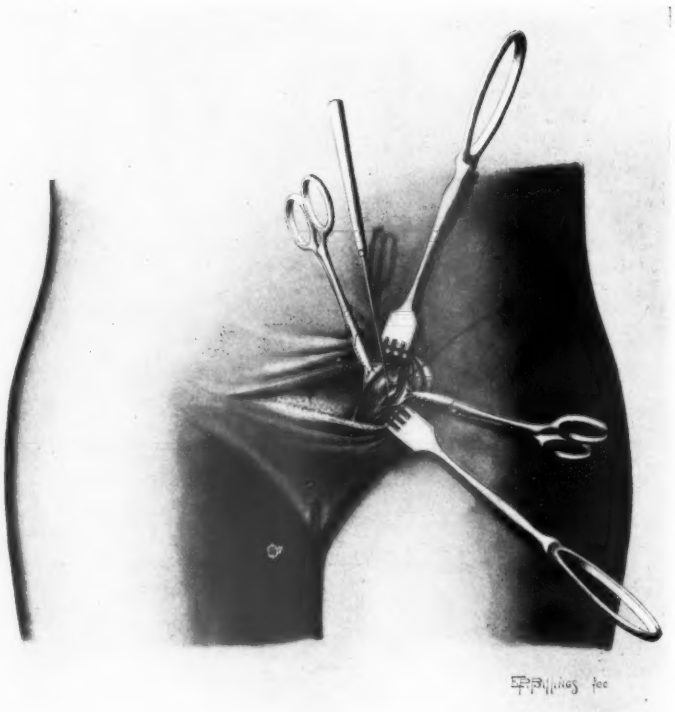

Fig. 6. Nerve held outside of external edge of fascia to prevent injury while search is made for round ligament. Latter always lies at the edge of and just underneath muscle.

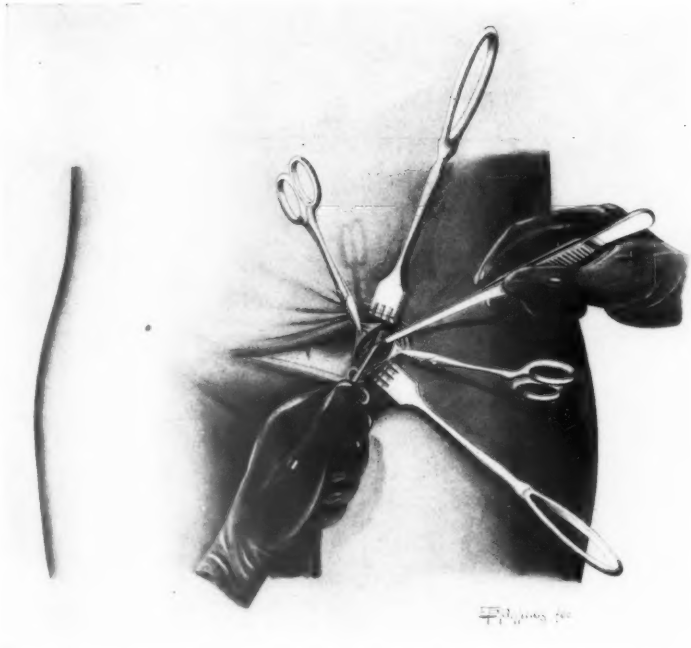

Fig. 7. Showing method of stripping peritoneum from round ligament.

length of this incision will vary with the case, but even in the most obese patients it need not be more than two and a half inches. The deeper portions of the incision can be cleared of the loose tissue by a few transverse strokes of the scalpel. The upper portion of the incision is now drawn upward by retractors (Fig. 2), and the fascia exposed with scalpel or sponge for a distance of two or more inches, depending upon the amount of intrapelvic work to be done, which will naturally determine the length of the longitudinal incision through fascia and peritoneum. For the ordinary case a small incision admitting the index and middle fingers will suffice. Care must be taken after separating the muscles, and before opening the cavity, to seize the peritoneum as far away from the pubes as possible. (Fig. 2.) In this way it is always possible to avoid opening the bladder, even when the latter is carried abnormally upward. Through this small peritoneal incision all ordinary intrapelvic work can be accomplished. Adhesions of the appendages and uterus should be released and the diseased organs resected or removed. Ordinarily the appendix can be inspected and removed, if necessary, through this same incision.

Small retractors are next inserted into the transverse incision and the tissues pulled outward. (Fig. 3.) The guide to the external ring will be the spine of the pubes, at the base of which it will always be found. A few strokes of the knife will expose the ring, the edges of which should be carefully cleared. The upper wall of the canal should now be divided upward for about an inch, a grooved director being used as a guide. The contents of the canal are now fully exposed. The edges of the fascia should be seized with hæmostats and drawn outward and inward, and the undersurface of the fascia cleared for a distance of half an inch. (Fig. 5.) The genital branch of the genitocrural nerve should now be sought

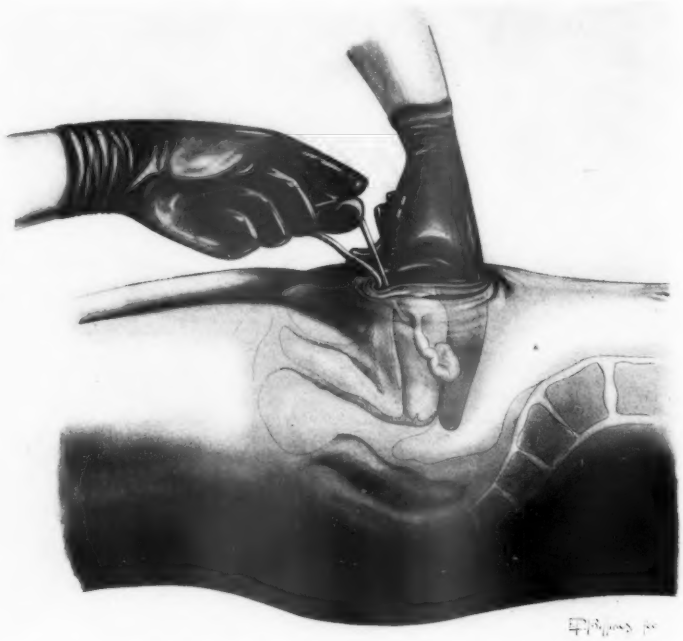

Fig. 8. Two fingers passed through the short peritoneal incision determine how much round ligaments should be shortened and exact position of fundus and cervix.

for, carefully isolated, and preserved from injury by being passed outside the outer edge of the fascia and held in this position by the hæmostat, which grasps the fascia. (Fig. 6.)

The round ligament will almost invariably be found lying just at the edge of and slightly underneath the muscle. It will be easily found, if the contents of the canal are not unduly disturbed and relations thereby destroyed. With the forefinger palpate and locate the internal inguinal ring. Then seize a small amount of the tissue lying to the outside of the muscle, and roll the latter upward. (Fig. 6.) The white fibers of the ligament at once appear. Seize the tissues well down toward the internal ring, so as to avoid breaking the ligament. Then strip the latter of its peritoneal covering in the usual manner. (Fig. 7.) After two or three inches of the ligament have been drawn out, steady the latter with the left hand and insert the fingers of the other hand into the abdominal cavity, in order to determine the proper position of the uterus and the degree of shortening of the ligament to be secured. (Fig. 8.) Mark this by seizing the ligament with a hæmostat at the point where it emerges from the internal ring. The opposite ligament should be located and shortened in a similar manner. After marking the degree of shortening of the second ligament, make a final intrapelvic examination, in order to be sure that the uterus is in the median line, that the fundus is forward, and that the cervix points backward.

The nerve should now be released and dropped to the bottom of the canal. The

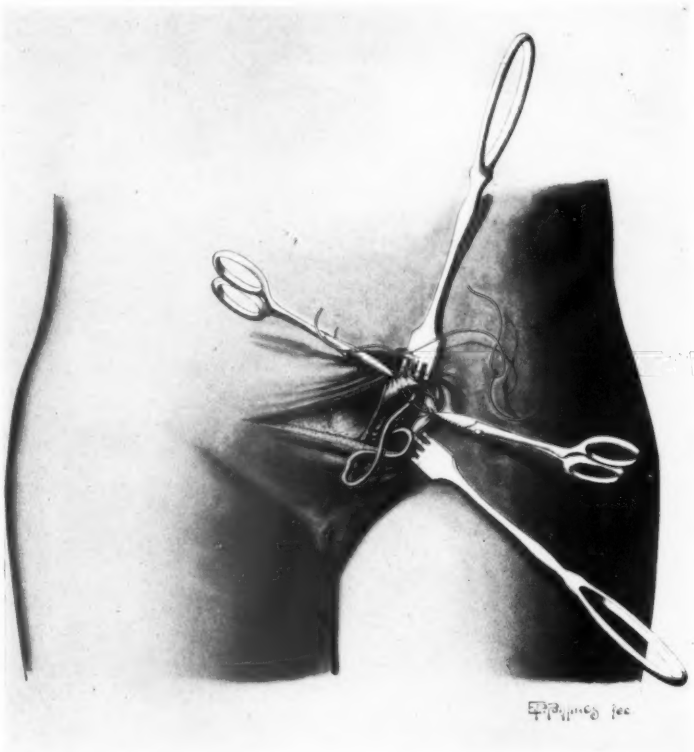

Fig. 9. Method of suturing round ligament. Mattress suture of twenty-day catgut passed through two edges of the fascia and twice through the ligament.

round ligament is secured by a mattress suture of catgut, which starts just beneath the edge of the fascia, passes through the ligament just above the hæmostat, catches the fascia of the opposite side just below its edge, and then is passed back again through the ligament below the hæmostat. (Fig. 9.) After catching the side of the fascia from which it started, the suture is securely tied. The loose end of the ligament is not cut away, but is dropped back into the canal. The cut edges of the fascia are now united with a continuous catgut suture.

The incision through the peritoneum is closed with catgut in layers. All dead spaces at the depths of the incision are avoided by passing a number of interrupted catgut sutures through both edges of the incision, including in the center of the suture a small portion of the fascia. (Fig. 10.) The skin incision can be closed in accordance with the operator's desires.

If extensive abdominal work is to be done, the median longitudinal is preferable to the transverse incision, although almost everything can be done through the latter.

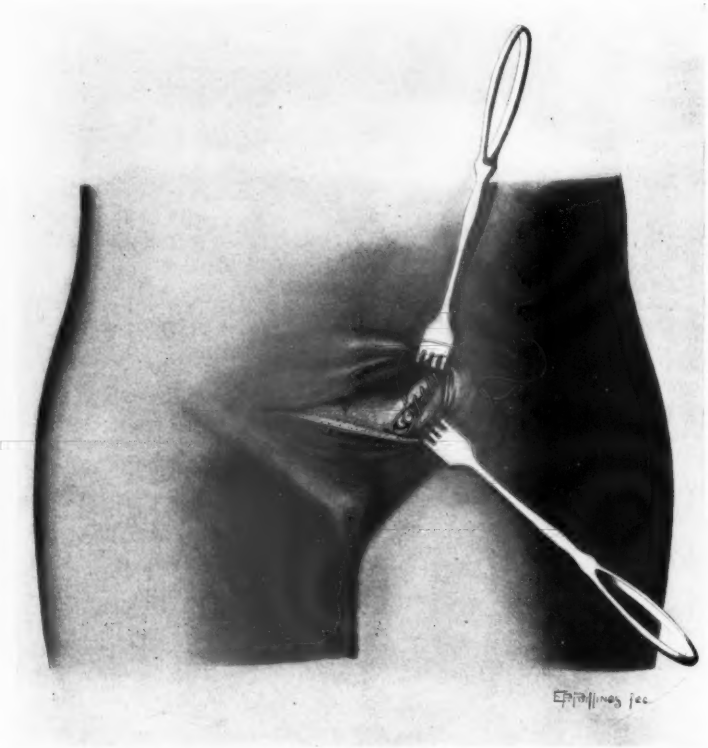

Fig. 10. The round ligament is not cut off, but the shortened portion is replaced in canal. Edges of fascia united by a continuous catgut suture.

If the median longitudinal incision be started just above the pubes, the inguinal rings can be exposed almost as readily as through the transverse incision. (Fig. 4.) Again, if the operator prefers the longitudinal to the transverse incision, in the simpler pelvic cases he need only employ a very small incision, as far as shortening the ligaments is concerned. An incision not more than two and a half inches in length will suffice.

In the University of Michigan Gynecological Clinic, the operation I have described has been performed upon fifty-five patients. In forty-six cases the transverse and in nine cases the longitudinal incision was employed. The ligaments have been readily found in almost all the cases. They were always present. They were once or twice very small. Once or twice they broke as they were being stripped, necessitating the passing of a forceps through the internal ring, a puncture of the parietal peritoneum, and the seizure of the ligament within the abdomen near the horn of the uterus.

Such an accident, however, is liable to happen occasionally, and at once shows the advantages of the present over the old technique. In Alexander's operation, when such an accident occurs, an additional median incision becomes imperative.

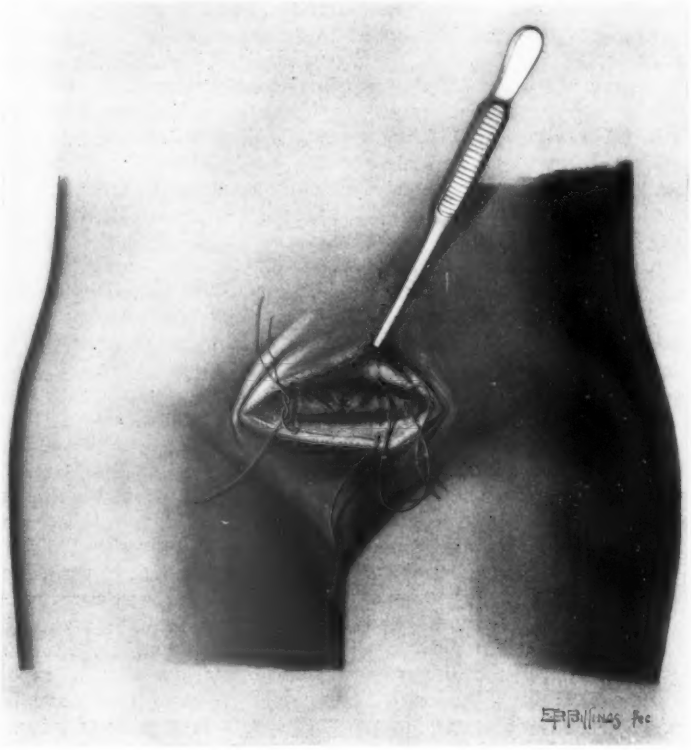

Fig. 11. Showing method of passing deep catgut sutures so as to do away with any dead space.

Too short a time has elapsed to speak of the ultimate results of the series of operations mentioned above. As far as known, there have been no relapses.

# A REPORT OF TWO CASES OF HYPERNEPHROMA RENIS[1]

## With Remarks

By J. WESLEY BOVÉE, M. D., Washington, D. C.

A TUMOR springing from adrenal tissue, whether in the suprarenal gland or displaced, is called a hypernephroma.

Interest in the peculiar adrenal tumor called hypernephroma is shared by both operating surgeons and pathologists. And yet one, in talking with confrères about this growth, is impressed with the lack of knowledge concerning it. A few surgeons, operating every day, confessed to me they had never heard of such a tumor. This statement, when taken in connection with the fact that hypernephroma is the commonest form of renal neoplasm, seems remarkably extravagant. It has not been long since its rarity was attested by all observers who had been sufficiently fortunate to study hypernephroma. To-day we know it is the commonest form of kidney tumor. This is an important fact, when we consider that there is no organ in the human body in which new growths are more numerous or more variegated, even when metastatic or secondary ones are excluded. The reason for this disparity between the earlier ideas and our present knowledge concerning these tumors is, that kidney tumors have been more carefully studied, and many formerly thought to have sprung from kidney structure have since been found to have originated from islands of suprarenal tissue included in the kidney,—the so-called suprarenal "rests." Most of the tumors in or connected with the kidney are now known to have had this origin. For our knowledge of this class of tumors we are indebted to Grawitz, who, in 1883, first indicated that certain of the tumors of the kidney that had not been well understood really came from suprarenal "rests" in the kidney, and not from kidney structure at all. He gave them the name of "strumæ suprarenales lipomatodes aberratæ." In this class he placed lipomas angioma cavernosum renis, myxolipoma telangiectodes in capsulatum renis utriusque, myxoma lipomatodes renis, and myxoma renis, as well as Virchow's lipomatoid new growth, the lipoma intraperinéphrétique of Klebs and Sabourin, and the glandular carcinoma of Sturm. He afterward extended this class to include the adenoma renalis alveolaris of Weichselbaum and Greenish. He further demonstrated that though these growths might at first be benign, later they were apt to be malignant. Many pathologists proceeded with little delay to confirm Grawitz's statement. Sudeck, however, absolutely denied the reliability of Grawitz's statements, but Lubarsch and Askanazy so strongly supported Grawitz, that his views have been accepted. The opposition to the opinion of Grawitz is composed of observers who believe either that these tumors spring from the mucosa of the uriniferous tubules and those who regard them as of endothelial origin from a proliferation of the perithelium of the blood-vessels or the endothelium of the perivascular lymph spaces.

A very exhaustive and highly scientific paper on the subject of hypernephroma was published by A. O. J. Kelly in the Philadelphia *Medical Journal*, 1898, vol. ii, p. 223. The bibliography of that paper is large, and furnishes one with references practically covering the literature of the subject down to the time of its writing. Moreover, it contains a report of eleven unpublished cases that have been carefully studied. It is a mine of information on the subject of hypernephroma, and I commend it to students of this subject.

### GENERAL CHARACTERISTICS

This class of tumors is usually noticed clinically in advanced life, when they have assumed a considerable size and have caused trouble that demanded relief. This fact led to the belief that they were always malignant. Studied from the standpoints of anatomy and pathology, they are found in a benign state, especially in early life, and even after the age of fifty

[1] Read before the American Gynecological Society, Hot Springs, Virginia, May 24, 1906.

years has passed. They are found accidentally on the necropsy-table in routine work, and in such case are usually benign in character. Hansemann says the majority of the smaller variety remain stationary. It is known they may remain thus for years and then take on malignant character.

That misplacement of inclusion of tissue elements often occurs in the human body is well attested. Particularly is this peculiarity noted in the deposits of the suprarenal gland tissue at various points along the genitourinary tract. Such inclusions or "rests" have been found in the solar and renal plexus, under the capsule of and in the substance of the kidney; in the perinephritic tissue; in the broad ligament; along the spermatic vessels; in the testicle and ovary, in the liver, the mesentery, and in the inguinal canal. Holmes says such rests are found in ninety per cent of all necropsies. This can be attributed to the juxtaposition of the suprarenals to the mesonephros and internal sexual organs in embryological development. The male sex seems most subject to this growth, though my two cases were in women. Bierring says: "Although it is true that we cannot, on microscopical examination, differentiate between the benign and the malignant, yet it is also true that some are far more malignant than others." Those arising from the adrenal itself are, as a rule, quite well circumscribed, and separated from the kidney by a well-defined connective tissue capsule, whereas those which originate within the kidney present somewhat more malignant manifestations. Ohlmacher reports two cases of considerable size that were well encapsulated, had no infiltrating tendencies, and did not give rise to metastatic formations. They might be classed as benign. Others have marked infiltrating tendency or metastatic deposits, and alarming symptoms, as pain and hæmaturia, fever, etc.

### CLASSIFICATION

The varying structural appearance noted in these tumors has led to attempts at classification of them. While not fully satisfactory, yet a classification of them into alveolar and cortical is probably the best. This very likely depends largely upon whether they spring from the suprarenal gland inclosed by the kidney capsule or from islands of adrenal tissue surrounded by renal tissue.

### GROSS ANATOMY AND PATHOLOGY

These growths are usually flesh-colored or a beautiful canary yellow. And it is not uncommon to find in the larger ones softened and broken-down portions mixed with blood-clots, often in concentric layers, indicative of repeated hemorrhages. These tumors are usually soft and kidney-shaped, though they may be rounded, and they vary in size from that of a pea to six, eight, or ten inches in diameter. They seem to be distinct from the kidney, as a rule. But infiltration lessens the distinctive differential outline of them. On cut section of the larger specimens we find areas of softening and necrosis. The large masses of coagulated blood are probably due to the vascular character of them and to the lack of connective tissue support to the vessels. The stroma consists of dense connective tissue, however, in spots, and of a delicate network of capillaries, mingled with tumor-cells that are large and round or polygonal. They are usually arranged in rows, and are rich in fat and glycogen. This is said to be the picture of the cortical variety. When the medullary portion is more particularly represented, we find the alveolar form, in which the spaces are filled with large polygonal, medullary cells. In some specimens both varieties are found.

### MODE OF EXTENSION

When infiltration occurs, it is into the renal tissue, the pelvis, the renal vein, and even into the vena cava. They even extend along the ureteral mucosa to the bladder. Probably they rarely, if ever, extend along the lymphatics, notwithstanding the belief of some pathologists, as previously mentioned, that they originate from the endothelium of the lymph spaces. It seems more than likely, however, that, like other forms of infiltrating growths, the lymphatics perform a share of the work. Bierring points out that these cells, proliferating so rapidly, would naturally extend along lines of least resistance — the lymph spaces — and if such be true, we should expect the lymph-

channels to act as avenues of extension. In one of his cases there was marked infiltration of the retroperitoneal glands.

### METASTASES

Metastases occur in various parts of the body. The liver is a very common site for such desposits. Le Count reports a case in which a primary tumor the size of a hen's egg involved the lower pole of the right kidney. By extension, it filled the pelvis, and the bones on the right side followed by a pathologic fracture of the right ilium. It also extended through the first sacral vertebra, which led to a tumor formation of the right buttock, with ulceration and gangrene. Metastases were also found in the left iliac lymph-glands and the left femur, the latter resulting in a pathologic fracture of that bone about three months before death. Implantations along the urinary tract and in the peritoneal cavity are frequently met with.

### SECONDARY MANIFESTATIONS

These have practically the same formation and appearance as in the original tumor, the color, hemorrhagic and necrotic areas being about the same.

### SYMPTOMATOLOGY

No doubt these tumors are present for years in the benign form without ever giving rise to symptoms. Especially is this true in the very small growths, though I am quite willing to admit that a more extended study may necessitate a modification of this statement. In many, the patients have noticed a kidney tumor present for years, during which they enjoyed good health. Suddenly they have been stricken with localized pain, sudden increase in size of tumor, hæmaturia, fever, chills, and prostration, with loss of flesh and cachexia, to be followed by death, or relief by early surgical intervention. Urinary changes are not of constant diagnostic value, as oftentimes they are absent. This is particularly the case in the benign form. When infiltration occurs, papillary excrescences may develop in the uriniferous tubules or pelvis, and hemorrhage occurs. In one of my cases, pus and tube casts were found in abundance. In the later stages, when metastases have occurred, the symptoms will vary according to the tissue involved.

### DIAGNOSIS

This is never positive. We have to rely upon the presence of a renal tumor, perhaps of years' duration, and apparently harmless in the case of the benign form. This must be differentiated from renal tuberculosis or calculous pyonephrosis and renal calculi. In the malignant form, we, as a rule, have the history of a benign tumor for years, and suddenly localized pain, chill, fever, hæmaturia, increase in size of tumor, abnormal urinary ingredients, cachexia, and loss of weight. These, again, must not be confounded with tuberculosis, calculi, and malignant true renal tumors. We have also to recollect that most renal tumors are of this variety. Much has been written of the importance of the presence of glycogen in the tumor, and of its diagnostic value. Grawitz spoke of this, Kelly lays some stress upon it, and Crafton has been working along this line. Following the suggestion of Kelly that hypernephromas should show the characteristics, chemically, of the suprarenal gland, he experimented, and states his belief that hypernephroma may be differentiated from other renal tumors. He found that a watery solution of the suprarenal glands possessed the following properties: 1. Injected into the body of a dog or rabbit, it produces glycosuria; 2. It possesses the power of converting starch into dextrose and maltose, and this power of the extract is lost on boiling; 3. It causes the blue color produced by iodine in a starch solution to disappear. He found hypernephromas acted similarly to suprarenal tissue, and believes this point alone is sufficient for differentiation of hypernephroma. It is of no value before operation, but rather assists the pathologist in his diagnosis.

### PROGNOSIS

The prognosis in the case of the benign tumor is not so bad, particularly if nephrectomy is done early. In the malignant form the outcome becomes more hazardous. In many cases, particularly if metastases have occurred, we cannot hope for anything better than a fatal ending.

TREATMENT

Realizing that hypernephroma is by far the most common form of renal tumor, that the symptoms are so unreliable for differentiation between the benign and the early stages of malignancy, and that the advanced malignant tumor is so fatal, one can scarcely avoid recommeding extirpation of every renal tumor, especially if of long duration. It goes without saying, the malignant form, if seen early, more peremptorily demands extirpation.

As too late operation is the *bête noir* of malignant tumors everywhere, to be consistent with the usual treatment of malignant growths, we must hail with gladness an opportunity to remove a tumor in a benign stage, rather than to accept additional dangers, both as to complications of operation and of ultimate eradication that necessarily attend operation for malignant growths.

I must offer my protest against the transperitoneal route for extirpation. The danger of infection of the peritoneum, either by pieces of the tumor or pyogenic organisms that may be present, is certainly apparent. This necessitates the employment of the extraperitoneal route. The most rapid and useful incision is the transverse one. It is quickly made, and furnishes a wound that is easily drained without interference, with prompt union of the upper or anterior portion of it. The least possible amount of manipulation of the tumor in its removal is recommended, and with reason, lest fragments of it be forced into the renal vein. I would also caution against rupture or puncture of the growth, as one is tempted to do, on account of its softness and extreme size.

The two cases I have to report in this paper are as follows:

CASE 1. *Nephrotomy, followed by incomplete nephroureterectomy for pyonephrosis, adrenal tumor, and pyoureter; extraperitoneal operation; recovery.*

Mrs. F. S., white, 38 years of age, was seen with Dr. Roman, of my city, February 16, 1900. She had had five children, the last having been born seventeen days previously. The preceding autumn she had had chills and fever, which did not yield to the administration of quinine, but continued to time of labor. With the beginning of the chills she noticed a "tumor" to the right of the womb, which was very painful and prevented her from getting her usual sleep. During labor, Dr. Roman had discovered the mass in the region of the right kidney, and her temperature to be 102° F. The labor had been normal, but the fever had continued, raging from 100° to 104° F. Believing he was dealing with a suppurating kidney, I was called. At this visit I found a small, emaciated woman, weighing about eighty pounds, having a temperature of 102° F. and a pulse of 130. Her skin was very dry and tongue furred. A mass of about the size of an average-sized infant's head was notable in the region of the right kidney. Nephrotomy was advised, and she was sent to Columbia Hospital for Women for that purpose. The urinalysis made the following day showed as follows: Color, brownish yellow; heavy sediment, acid reaction; specific gravity, 1.023; a trace of albumin was present; urea, seven grains to the ounce; pus-cells abundant; no casts or tubercle bacilli were found. No ureteral catheterism was resorted to, as the patient was very ill, and a nephrotomy, at least, seemed urgently necessary, which was done on the 19th, opening seven pus-pockets in the kidney and cutting away a piece of the organ for microscopical examination. The operation required but a few minutes, and was done during extreme stimulation, yet death was barely averted. The pulse ranged from 136 to 160 at the time, and nothing more than emptying the pus collections was to be considered. Destruction of the kidney structure seemed universal. The temperature returned to normal, the pulse dropped to less than 100, and she improved materially, though pus continued to come freely from the loin wound. The day after nephrotomy the urinalysis report was: Quantity for twenty-four hours, 21½ ounces; reaction, acid; 2 per cent of albumin present; no casts or blood, but pus present. The quantity gradually increased to more than thirty ounces, having occasionally an alkaline reaction, and nearly always a trace of albumin and pus. On March 10, 1901, the temperature and pulse raised rapidly to a dangerous point, though the wound was discharging large quantities of pus. Two days later I removed the kidney and ureter to the middle of the pelvic portion. The kidney was found to be very much smaller, and contained a few pus-pockets. No urine had leaked through the drainage tract since the nephrotomy. About the middle of the pelvic portion of the ureter was found a mulberry calculus, with diameters varying from three eighths to five eighths of an inch, completely blocking its lumen. The peritoneum was slightly opened in two places during removal of the ureter, and they were immediately closed with running catgut. Daily examinations of the urine from the time of this operation to April 4th showed a gradual decrease in the abnormal elements and a complete absence of them at the time of her leaving the hospital, April 6, 1901.

Dr. James Carroll, U. S. A., examined the specimens removed, and reported on them as follows: "The kidney is the seat of a chronic interstitial inflammation, probably a pressure nephritis. The pelvis is lined by a wall of granulation tissue. In the cortical substance beneath the capsule and in the deeper structures, there are sharply circumscribed and diffused areas, composed of large polygonal epithelial cells

whose protoplasm is filled with fine fat droplets. They are usually arranged in single rows, separated by a delicate stroma, and appear to be aberrant adrenal growths originating from embryonal remnants. In the gross specimen, these areas were sharply circumscribed and of a distinctly yellow color. The kidney is dotted with yellow masses of new growths, and the same growth appears on the capsule. The ureter was much thickened and dilated above the site of the calculus."

CASE 2. *Renal hypernephroma; acute symptoms; nephrectomy; recovery.*

Mrs. N., white, aged 53 years, wife of a naval officer, was seen February 4, 1906, with Drs. E. W. Reisinger and W. S. Dixon, U. S. N. She had had one child, which had grown to maturity, and no other pregnancies. Her mother was said to have had a malignant liver neoplasm. The patient could remember that as far back as five years ago, she had noticed a permanent tumor just below the liver, in the right side of the abdomen. She had enjoyed excellent health, notwithstanding the presence of this growth. About February 1st, she had been seized with severe pain in the region of the tumor mentioned, accompanied with abdominal distention and nausea. Morphia in large doses hypodermatically was required for the pain. When I saw her she was suffering little pain, but was exquisitely tender in the right upper quadrant of the abdomen, and marked tympanitis. An irregularly globular tumor having a transverse diameter of about five inches was noticed, bulging forward the anterior abdominal wall just below the ribs, and about four inches to the right of the median line. It was semifluctuant and tender, and did not move with the diaphragm in respiration. Her temperature was 101° and pulse 112. The following day, a specimen of her urine was sent to the Naval Museum of Hygiene, and the examination it of was reported by Surgeon T. A. Berryhill as follows: Quantity, 250 c.c.; color, high; reaction, acid; specific gravity, 1.013; albumin, 4 per cent by volume; sugar, none; urea, 1.3 per cent. There are thousands of casts in each microscopic field, granular casts, renal cells, and blood.

February 9, 1906, I again saw Mrs. N., with the physicians mentioned. The localized tenderness was lessened, the abdomen was less distended, but fever and high pulse-rate were present. The patient was in such a state of exhaustion and anxiety, that urinary segregation was deemed inadvisable. She was therefore taken to the Georgetown University Hospital, February 11th, and the following day operated upon. The temperature was 103.8° and the pulse-rate 102. A transverse incision directly over the tumor was made, and the mass removed extraperitoneally. Through the inner end of the wound the peritoneum was opened, and the liver and gall-bladder palpated. Nothing abnormal was found with either, and the peritoneum was immediately closed. The large renal mass broke upon manipulation, and some soft, thick, grimy material having a dark brown color escaped. The vessels and ureter were clamped under the mass by the sense of touch, and severed. Gauze packing was employed, and the upper three fourths of the incision closed by buried absorbable suture material. The temperature after operation did not exceed 99.4°, and the pulse-rate was correspondingly reduced. After February 17th the temperature remained normal. During the first twenty-four hours after operation, the quantity of urine excreted was 45½ ounces, and for the second similar period 68 ounces. It varied from 25 to 74 ounces a day for the next 13 days. Surgeon Berryhill reported, February 26th, that the urine contained numerous hyaline and fine granular casts, slightly fatty, and renal cells adherent. A few waxy casts, squamous, and a few renal cells and leucocytes; a little mucus and triple phosphates.

On March 10th and 21st he reports specific gravity 1.011; albumin, a slight trace; urea, .8 per cent; many squamous cells, an occasional leucocyte, and a little mucus. She recovered, and, May 17th, was in excellent health and spirits.

The specimen as herewith shown was critically examined at the Army Medical Museum by Dr. James Carroll, curator, and his assistants, Dr. Healy and Mr. John S. Neate, whose report upon it is as follows:

"This specimen consists of the right kidney partially enveloped in a new growth, irregularly ovoid in shape, and somewhat distorted from compression in a vessel too small to hold it when first removed, giving it a rather more cylindrical appearance than originally belonged to it.

"It weighs 860 grams, is about 16 cm. in length, 13 cm. in breadth, and 31 cm. in circumference.

"In general, its surface is smooth, of a dark, reddish brown color, mottled with yellowish areas where fatty tissue predominates. By shallow fissures it is longitudinally divided into unequal lobes. The firmer kidney substance, which can be easily differentiated from the tumor, appeared to comprise about one third of the mass before dissection was attempted. The neoplasm, darker in color and of a soft consistency, exhibits about its center and corresponding to its most compressible portion an irregular fracture of the capsule, exposing a cavity of the size of a hen's egg, partially filled with spongy, hemorrhagic, necrotic detritus. This rent was the unavoidable result of manipulation during the operation.

"The whole mass is inclosed in a distinct capsule, continuous with that of the kidney, but over the new growth it is of greater thickness. When received at the laboratory it was at once pronounced by several observers as a sarcoma. Dr. Carroll, U. S. A., the curator of the museum, however, stated that it was most probably a tumor of aberrant adrenal origin, which diagnosis subsequently proved to be correct.

"After fixation in Kaiserling's solution, the kidney was partially dissected away from the tumor, when it was found that the kidney which presented so much surface externally was but a mere shell, varying in thickness from three fourths of an inch at the poles to a feather edge, where the capsule became continuous with that of the tumor.

"The new growth now exposed has a more rounded and symmetrical appearance, resting in the pelvis of the kidney, to which its capsule is attached by a

number of fibrous bands, running in the direction of the pyramids, a few of which can be clearly seen in the thin shell before noted. The greater portion of the kidney substance has been engulfed by the neoplasm, or pressed outward as a cap, and from its position suggesting strongly that the original point of origin of the tumor was somewhere near the hilum.

"Unfortunately, neither the ureter nor renal vessels could be located without so much dissection as would have destroyed the value of the specimen for exhibition.

"On section through the center of the new growth, it presents a curiously mottled appearance, characteristic of large tumors of this class, varying in color from a light yellow to a dark brownish red, and is inclosed by a distinct fibrous capsule about one eighth of an inch in thickness, from which several fibrous trabeculæ tend toward the center, and round which are loosely grouped, light-yellow, roundish nodules of a cheesy consistency, varying in size from that of a pea to a hazlenut, and many of them presenting gelatinoid or mucoid centers. Between these nodules are varicolored, friable masses of necrosed tissue, and cavities filled with granular débris and coagulated blood.

"Near the rent in the capsule before mentioned, this yellowish tumor growth appears upon the surface, having penetrated the capsule, the edges of which are clearly seen to be everted.

"Several sections were taken from the growth directly adjacent to the kidney, and from the necrotic and hemorrhagic portions further removed from that organ, imbedded in celloidin, cut and stained with hematoxylon and eosin.

"*Microscopic Examination.* Sections under the microscope, whether from the well-preserved or degenerated portion of the tumor, show masses of epithelial-like cells, whose appearance and grouping more, closely resemble the parenchymatous cells of the cortex of the normal suprarenal body, than any other tissue or neoplasm common to the human body.

"The kidney structure adjacent to the tumor shows the effects of atrophy and pressure, a decided connective tissue increase, beneath the capsule large areas of round-cell infiltration, atrophy of the tubules, and fibrous transformation of the glomeruli. The tubular epithelium is granular and desquamating, and some tubules contain casts. The parenchymatous and fibroid changes are most noticeable in the vicinity of the tumor.

"The capsule of the tumor, as shown by one of the sections, is made up of a condensation of the connective tissue of the kidney, consisting of fibrous strands inclosing masses of round cells, the vestiges of tubules, and fibroid glomeruli compressed into more or less irregularly defined layers. From this connective tissue envelope fibrous trabeculæ penetrate the neoplasm conveying blood-vessels, and which break up into numerous capillaries and fine fibrillæ, subdividing the tumor into irregular alveoli lined with cells of epithelial type. These alveoli, formed by delicate fibrous reticulum or capillaries, vary much in size and shape, some representing long thin columns two or three cells in width, or wider irregular spaces filled with many detached cells, but in general preserving atypically the arrangement of the alveoli of the cortex of the adrenal body. The cells lining these spaces of the tumor are cuboidal, polygonal, or irregular, according to location. At the margins of the spaces where they rest directly on the capillaries, which frequently show as mere threads of endothelial cells, they are cuboidal or columnar, and with a semblance to regularity in arrangement becoming polyhedral or quite irregular in the centers of the masses. The cytoplasm of these cells, usually rather scant, stain with varying intensity, occasionally exhibiting vacuoles or fat-droplets, less sharply defined, however, than is usual in similar types of cells when infiltrated with fat.

"In the degenerated portion of the tumor, the protoplasm of these cells exhibits more markedly a reticular or vacuolated structure, suggesting fatty changes. The nuclei are large and stain well; in some, nucleoli can be seen; and giant cells, while not numerous, are present.

"Nowhere in the sections examined is there any suggestion of the tubular arrangement characteristic of the kidney or adenomata.

"Marked degenerative changes are a prominent feature of this tumor. In the sections removed from the necrotic areas, the tumor-cells can be made out as mere outlines or shadows with faintly stained nuclei invaded by clouds of polymorphonuclear leucocytes, the nuclei of many of which are fragmented. In other areas, extensive hemorrhages have occurred, imparting to the growth that varicolored appearance so frequently referred to."

The cellular degeneration and hemorrhages bear, no doubt, a direct relation to the arrangement of the tumor-cells and the blood-vessels, with which they are in direct contact, and bring to the fore the absorbing question of metastasis and malignancy.

Upon this subject, in view of the confused terminology, I may be allowed to refer briefly to the opinion of recent investigators of these adrenal tumors.

In discussing the differential diagnosis of benign and malignant hypernephroma, Dr. Peuckert (1) says: "The arrangement of the tumor-cells corresponds more or less with that of the suprarenal body, but, nevertheless, an atypical condition is often found. Usually, the cells, especially those of the more recent portion in the outer part of the tumor, lie in two parallel rows, without any intercellular substance. In other parts of the growth, the cells are arranged in clusters, which are bordered by capillaries. However, contrary to what is

found in benign growths, the spaces between the neighboring capillaries are much larger and irregular. The first row of cells is fairly perpendicular to the capillaries, but the cells in the intermediate spaces are usually placed irregularly. That it is difficult to distinguish between benign and malignant tumors of the suprarenal body has been made evident by Hanseman, and he says: "Every hypernephroma of the kidney is a malignant tumor. Just as carcinoma occurs, which may exist for years without taking on a rapid growth or producing metastases, so, also, relatively latent periods exist in the life of the hypernephroma. Between the hypernephroma arising in the kidney as an isolated tumor reaching the size of a hazelnut, and one which has produced hundreds of metastases, I am unable to find any radical histologic difference. One cannot appreciate the danger of its malignancy by merely examining a single section of the tumor."

Among the arguments advanced by Grawitz for the diagnosis of malignant tumors originating from aberrant germs of the suprarenal body in the kidney are the following: "The cell formation of the tumor typically differs from the shape of the epithelium of the urinary canals. The tumors are always encapsulated. The arrangements of the cells and very scanty stroma, which may be almost absent, are characteristic of the suprarenal body. The hemorrhages and resulting retrogressive metamorphoses should also be included among the characteristic signs of malignant growths, and, above all, their tendency toward progressive development and the formation of metastases."

Dr. Ellis (2), writing on the pathology of hypernephroma, states: "Small hypernephromas, giving rise to no symptoms, and found only at autopsy, are as benign as the adrenal rests from which they spring. It is just as evident that the larger growths, which extensively destroy surrounding tissue by pressure or by actually breaking through the capsule, possess malignant attributes. This attains its highest degree in the formation of metastatic growths in other tissues of the body. On this basis, all hypernephromas may be regarded as potentially malignant."

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# CONSERVATIVE OPERATIONS ON THE OVARIES [1]

By J M BALDY, M. D. Philadelphia

THE subject of conservative operations on the ovaries is so comprehensive that one must of necessity limit the field of consideration as much as possible, and of first importance in this respect is a common understanding of the word "conservative." The old surgical dictum to "save as much tissue as possible" is apparently the commonly accepted interpretation, and it is because this is so that there seems to be such an irreconcilable difference of opinions among men of equal ability in other respects.

In dealing with the ovaries, can we with full justification to our patients accept this interpretation? Without pretending to enter into an argument, I must decline emphatically to do so in the limited meaning of the bare statement, "Save as much tissue as possible," without qualification. That qualification must carry with it the necessity of removing all sufficiently diseased tissue, all apparently healthy tissue when it is justifiably suspicious that it is causing or will cause serious trouble, and even the whole ovary if by such a sacrifice the patient's life is rendered tolerable where before it has been intolerable. This practice is exceedingly broad, and is open to great abuse, either from ignorance or from knavery, but it

[1] Read before the American Gynecological Society, Hot Springs, Virginia, May 23, 1906.

must be borne in mind that I am addressing a body of highest authority on these subjects in this country, and that there can be but one object to be obtained: the strict scientific truth. Let those abuse this truth who dare! Appeals to prejudice, by declaring a woman to be unsexed because her ovaries are removed, are worthy only of the ignorant, because such a thing as unsexing a woman in the sense that a man would be unsexed were his testicles removed does not obtain. What man of knowledge can say that a woman is a woman at forty, and not a woman (unsexed) at fifty? And yet, according to the argument of some, carried to its logical conclusion, during that interval the vast majority of women have become unsexed, forsooth, because they have been deprived of the use of their ovaries (by nature). Is the same woman any more unsexed because artificially she has acquired the menopause a few years earlier than the average woman? Or is the woman in whom the menopause has occurred naturally at 28, 30, or at any other period up to 45, unsexed?

If a woman has contracted gonorrhœa, and ovarian abscesses follow, is she not sterile? Are we to be reproached for removing that which threatens her life or renders her existence miserable? If there be such a thing as unsexing her, has not the disease already done this?

Senile sentiment has no place in deciding what should be done in the presence of a diseased ovary. Nor is the anatomical limit of disease and health in this organ the only thing to take into consideration. It is a most difficult thing to tell what is and what is not disease in the ovary, even microscopically, and in a very large number of instances it is necessary to decide the question by the symptoms, and not by the make-up of the organ.

Ovaries are punctured and resected daily for cysts, œdema, atrophy, and hypertrophy, and yet Ross long since called attention to the fact that these conditions may and do exist, and are normal, in that they most frequently give no untoward symptoms, as witness hydrops folliculi of the ovary, œdema of the ovary (in pregnancy), atrophy of the ovary (following the menopause), hypertrophy of the ovary (accompanying fibroid tumor of the uterus). Does not every one know that the so-called conservative is often most radical in the number of this class of cases upon which he finds occasion to operate? Even where symptoms and appearance go together, can one be blamed, in view of the literature of the subject, if he insist that in each individual case he be given the opportunity himself to judge between cause and effect before accepting the report as entirely accurate and of scientific value? As a matter of fact, conservative operations on the ovaries are so commonly mixed up with removal of adhesions, replacement of the uterus, and other accompanying procedures, that it is utterly impossible to distinguish between results.

Immediate results and end-results are far different things. And as for that, end-results are not even reliable. It is only by the survey of the whole case, general as well as local, together with a profound practical knowledge of human nature, as well as a sublime respect for the vagaries of women's nerves, that one can appreciate the full truth. Consider, for instance, the so-called moral effect of surgical operations. A young woman of twenty-four years of age was sent twelve years ago by a doctor friend, a half-companion and a half-servant to his wife. Had lived in his house for years, suffered in bed at menstrual periods for several days, had intramenstrual pain on left side, backaches, and pain running down thighs. Was becoming worse and worse. He wanted removal of ovaries. Finding no disease on palpation, I demurred. He insisted. She insisted. Finally, I consented to explore, provided the doctor would allow me, and me alone, to tell what had been done at the operation. I found the ovaries normal, as I expected, and closed the abdomen after merely looking at the pelvic organs. I informed the girl I had found a badly diseased left ovary, and had removed it; that she would be perfectly well. She convalesced; later, entered the training-school for nurses of a hospital with which I was connected, took a hard three years' course, and has since been in the practice of hospital and private nursing. She has never to my knowledge complained of a pain in the region of her ovaries, back, or thighs since the day of the operation. If this were an isolated case I should not mention it, but it is a con-

dition you have all met many times, and I quote it merely to emphasize the fact that the nervous system is a wonderfully complex thing, and that it must be taken seriously into consideration when estimating even end-results in conservative operations on the ovaries.

How simple a matter in this case to have punctured the small cysts containing both clear and bloody fluid which dotted the surface of both ovaries; ovaries of a character which our so-called conservative surgeons are so fond of calling polycystic, microcystic, sclerocystic, scleromicrocystic, follicular degenerations, blood-cysts, etc., *ad infinitum*, but which are nothing more nor less than normal hydrops folliculi, such as are common to almost every ovary I have ever seen, normal or otherwise, at times buried in the depths of the ovarian tissue, at other times studding the surface of the organ. The so-called blood-cysts are, in the vast majority of instances, corpus lutei in some one stage or other of their development. Corpus lutei containing bloody fluid and hydrops folliculi exist commonly in perfectly normal ovaries. Small uncomplicated growths in the ovary such as these give no symptoms whatever. In fact, the entire absence of pain is one of the notable characteristics of all uncomplicated ovarian cysts, large or small. This being true, what amount of importance can be given to the theory that the pain suffered by many women is induced by the tension of small hydrops folliculi or blood-cysts? And by what method is cure obtained through puncture of the cysts or by resection of the organ containing them?

End-results are important, but even they are deceptive, in that just as radical cures are obtained by exploration without puncture, and these results remain permanent in spite of the fact that the lesions (the relief of which is supposed to have accomplished the cure) return to even a greater degree than formerly, as witness a patient 25 years old, with ovaries enlarged (sclerotic) and cystic (hydrops folliculi and blood-cysts). Menstrual pain in bed for two days, intramenstrual pain in back and thighs. Puncture of cysts, with resection of half of one ovary on account of œdematous condition. Complete cure for two years. Return for appendicitis, operation between attacks, appendix removed and ovaries examined. Resected ovary as large as original organ, as full of cysts and as tense as formerly; other ovary half again as large, cystic, and extremely tense. Condition of ovaries worse than formerly, and yet no return of symptoms. This result is, beyond question, of common occurrence.

Again, end-results are important, in that large numbers are operated upon, the lesions corrected, and no good, or only temporary, results obtained, as witness:

CASE 1. Patient 30 years of age, with similar symptoms to the above. Dilatation and curettage a year before, no result, but becoming progressively worse. Examination showed normal pelvis with enlarged ovaries. Operation confirmed diagnosis. Numerous small cysts and a single blood-cyst with extreme tension of capsule. All cysts punctured, blood-cyst resected and sutured with fine catgut, ovaries shrunken and relaxed, tension entirely relieved. While in bed, not a trace of old symptoms, facial expression clear, bright and happy, and daily claiming a complete cure. Within one month after return home she began a bombardment of letters filled with complaints, and has since kept it up.

CASE 2. A similar case to the above, even to the prior dilatation and curettage. The same local conditions, the same procedures, with the same immediate results. The first three or four months at home perfectly well, happy, and enjoying life. Then a cold, and the menstrual period, which came on two days afterward, painful as formerly. A letter announced the fact, but with the qualification that she was sure it was all due to the cold, and everything would again be right. Now a year since, and the same old story obtains. Such cases are only too common.

With the group of cases with no results, with those with temporary results, with those in which the results are permanent but the local lesions return with renewed force, with the cases cured by exploration alone, with the almost constant temporary benefit to all these cases when put to bed and properly fed and nursed, with the cases gotten well by proper medical handling, can there still remain any doubt but that the vast majority of these women are neurasthenics and require no operation whatever? And can there be any doubt but that the surgeon who finds constant occasion to operate on them is the most radical of the radical?

It is impossible for men to meet on any common ground when some deem it necessary to operate on conditions considered entirely normal by others.

Ovarian transplantations, the internal secretion of the ovary, and the leaving of a small piece of ovary after each operation seem to be inseparably bound together, the men believing in the one believing in the other. Ovarian transplantation has proven a distinct disappointment, all the clinical evidence tending to support the supposition that the transplanted organs, whether homoplastic or heteroplastic, atrophy. The case reported primarily by Dudley as transplanted successfully, and the specimen obtained by hysterectomy later by reason of the intense suffering, was shown this society. The microscopic sections of this specimen disclosed an almost entire disappearance of all ovarian tissue from the seat of transplantation, and was a complete and final demonstration of what becomes of such operations, an ending which had been foreshadowed by the clinical picture of these cases primarily. The result of this case also disposes, in great measure, of the theories of Halban and Knauer, both of whom believe that the internal secretion of the ovary not only prevents the atrophy of the other sexual organs, but also exerts a marked influence on their development. The internal secretion of the ovary never was more than a theory, and that theory is by no means strengthened by end developments. If the theory of internal secretion of the ovaries falls as has that of transplantation, and the dangers of a recurrence of growths in the portion of the ovary which is left after a resection is recognized (Ehrenfest alone reports five such cases; Fisher, Waldstein, and others had similar experiences, as also had the author), with them go the best part of the reason for retention of part of an ovary at each and every operation, and leaves but two possible reasons for this procedure — the sentimental one of continuance of a bloody flow (which alone, in itself, is a filthy act) and the possibility of the prevention of the symptoms of the menopause. The question then arises, Does the retention of a part of an ovary prevent these symptoms, or are the symptoms worth preventing? It is a well-recognized fact that all the nerve phenomena of the change of life will at times take place in a woman from whom but a single ovary has been removed. A certain definite class is consequently eliminated from these results.

As a patient approaches near the period of the natural change, any mental advantage which might accrue to a young woman from the knowledge that she still had an ovary is lost in a still larger class.

The advantage of temporarily dispensing with the symptoms of the change is of no advantage at any age; every woman must pass through these symptoms, and as far as the mere symptoms themselves are concerned, she had better take all her sufferings at one time, and be done with them for good and all, rather than find part of them hanging over her head indefinitely.

Omitting the mental effect of the knowledge of the loss of the ovaries (whatever that may be), my experience is emphatically against the routine effort to save parts of these diseased organs at any age. The mental effect on patients in but exceptional cases is exactly in due proportion to the belief of their medical attendants and the degree of indiscretion with which they have discussed the matter with their patients. For my own part, I never put mischief into the heads of my patients by discussing the pros and cons of the matter with them, and I find that, with hardly an exception, a few years after their operations they are well and robust, retaining all the attributes and appearance of women, and *are* so in their own minds; content and happy, with about the same amount of regret that they cannot have children as people who naturally have never had any and who are reconciled to the inevitable.

There is one aspect of this subject which is almost universally ignored. It is this: A woman comes to the surgeon for relief from suffering; she is entitled to this relief, for which she confidingly places herself in his hands, and for which she is paying her good money, irrespective of any theory he may have as to the possibility of future pregnancy, of the advisability of a continued menstruation, or of his ideas as to the value of a supposed internal secretion of the ovary. She is entitled to a fair statement of facts and to judge for herself as to these matters. My own experience is almost unvaried. When I state that, in my opinion, such is the condition of her organs, that the conservative procedure is to make an

incomplete operation, removing a part and awaiting results, and then if a sufficient and satisfactory result is not obtained, to proceed at a second operation to complete the removal, I am met with these questions:

Can you assure me I will be well after such an operation?

Is there added danger to me in a second operation?

Will it be possible or likely that another tumor will grow in the ovary or piece of ovary left?

And by these objections:

I do not care to undergo the suffering of a second operation.

I am unable to bear the additional expense involved.

I have my children, and do not care for any more.

The ones with me have caused me sufficient suffering.

I want to be well, and to be well at once, if it is possible.

I want everything that is to be done to be done now.

As to the questions, who conscientiously can assure her? who can blame her for the objections? and who can deny her full right in the premises?

Not the whole object of a woman's life is to have children. After she has done so up to the point of wrecking her life by ill health, she surely is entitled to dispense with that function and relegate it to her more fortunate sisters if she chooses.

Putting the facts squarely before the ordinary woman, giving her full unprejudiced freedom of decision, in twenty-four cases out of twenty-five she will decide for a complete operation. The sentiment exists largely in the doctor, not in the woman, and the few who are influenced by it have been educated up to that point by the class of doctors that object to the removal of the ovaries because they found on analysis of a group of cases that "seventy-eight per cent subsequently suffered a notable loss of memory, sixty per cent were troubled with flashes of heat and vertigo; fifty per cent became irritable, less patient, and some so changed as to give way to violent and irresponsible fits of temper; forty-two per cent suffered more or less from mental depression; thirty-five per cent increased in weight, and some became abnormally fat," etc., their general intelligence being such as not to appreciate that the picture they draw as one of bad results following faulty judgment was merely the symptoms of the natural and inevitable menopause, and which would in a short time leave the woman as surely as they came to her.

The great value we have obtained from our knowledge of the fact that a piece of ovary can be saved and functionate is not in saving it in every case as a routine, simply for the sake of being able to say that the patient has an ovary, but in being able to do so in special cases where there is a desire for more children, and where the good done outbalances the risks taken. And, after all, is there anything new in this? have we not all striven for it from the beginning? and have we not all practised it for years?

# THE TECHNIQUE OF THE REPAIR OF LARGE VESICAL FISTULÆ[1]

By WILLIAM S. STONE M. D., New York City

IT is not the purpose of the writer to offer a new method of operating or to bring out any original points of technique, but rather to use the features presented in two cases that have come under his observation and treatment for illustrating such technical principles as seem especially adapted to the repair of the large fistulæ. This plan seems to be desirable, because such injuries are rare, and the surgeon who is confronted with their repair for the first time may hesitate as to what procedure to adopt, as the recent literature consists largely of the reports of individual cases, for the purpose, apparently, in most instances, of describing what the author considers a new operation, but which a careful review of the older literature shows is only a minor modification in some detail which the peculiarities of his case may have required.

The first case that the writer wishes to report was a primipara, twenty-four years of age, who had been delivered by podalic version, decapitation, and perforation of the aftercoming head, six weeks prior to the operation. The pelvic measurements showed a slight degree of general contraction. A complete laceration of the perineum was so surrounded by cicatrices that the vaginal entrance was markedly contracted, making it exceedingly difficult to inspect its upper part. The cicatricial tissue extended into the vagina in different directions. The urethra was laid open its entire length, except for a small collar at the meatus. Continuous with this opening in the urethra was one which included practically the entire septum between the vagina and bladder. It was so large that the bladder-wall prolapsed through the opening, the mucosa of which was uniformly and intensely congested. Its margin was everted and adherent to the vaginal wall, especially at the upper border, where it overlapped the anterior surface of the cervix. With the patient in Sims position, incisions were first made in the posterior sulci of the lower part of the vagina in order to expose effectively the field of operation. The cervix was then grasped with the volsellum and pulled down as far as possible. The everted and adherent bladder mucosa was dissected away from the cervix, and by making a transverse incision anterior to the cervix as in the performance of hysterectomy, the upper part of the bladder was freed as far as the peritoneal juncture. By means of blunt dissection at the sides, the entire upper portion of the bladder was thus freed, and by gradually working downward, the lower part was also separated from the edges of the fistula, care being taken not to injure the ureters, the openings of which could be readily seen. The upper and more movable part of the bladder-wall was then brought down and sutured with interrupted chromic gut sutures to the lower and more fixed portion, the line of suture running mostly in a transverse direction and effectually closing the bladder. The vaginal edges, although more movable than before the dissection, could not be brought into apposition without tension, but by bringing down the uterus which had been made movable by the dissection and suturing the vaginal edges to the sides and end of the cervix, the opening was closed without tension. The urethral mucosa was so thin and friable that no attempt was made to free it at the torn edge, but by an incision on either side through the vaginal wall, running parallel to and about half a centimeter from its edge, a flap was made which with the aid of the more movable flap around the bladder covered in the urethra fairly well. Interrupted sutures of black silk were used for the vaginal wall. A soft rubber catheter was kept permanently in the bladder for three days and the bladder irrigated once a day with boric-acid solution. The entire portion over the bladder healed by primary union, but a greater part of the urethra failed to unite. There was some power of retention, however, because the vesical neck was well covered. A subsequent operation, two weeks later, in which the dissection of the vaginal wall was more extensive, effectually closed in

[1] Read before the American Gynecological Society, Hot Springs, Virginia, May 24, 1906.

the urethra. One month later the perineum was repaired, when the function of the bladder was normal, except for a slight frequency.

The second case was a multipara, thirty years of age, who first came under observation a few weeks after a difficult labor suffering from a marked cystitis. Improvement quickly followed boric-acid irrigations. The cicatrices in the vagina were not so extensive as in the first case, and the urethra was not involved. The opening in the bladder was nearly as large, but its upper limits were not so close to the cervix. The same method of procedure was adopted as in the first case, except, owing to the greater mobility of the vaginal wall, the uterus was not used to the same extent in closing the vaginal opening. Union was complete, except for a very small opening where three corners had been rather imperfectly apposed. This was easily closed two weeks later.

It is unnecessary to give a complete review of the literature before this society, but a proper appreciation of the present technique requires a brief consideration of the steps, from which the present principles of operating have been evolved. It does not detract any from the pioneer work of Sims, Simon, and Emmet that the details which they considered so essential to success are now known to be unnecessary. Numerous successful cases, for example, are on record, in which all of the three points so forcibly claimed by Sims in 1852 as original and essential have been disregarded.

1. Even the Sims position for the better exposure of the field of operation has not been found essential by many operators, although the writer found it to be the best position in his own two cases. 2. The use of silver wire, undoubtedly the best material for the methods formerly employed, is now abandoned by the majority of operators, the writer using silk in one case and silkworm gut in the other, with equally good result. 3. Sims's special form of self-retaining catheter is now little used, and it may fairly be doubted whether any form of permanent catheter is necessary, as both McCann and E. Rothe have been successful without its use.

That the present methods of operating are not based upon principles which lawlessly disregard these older ideas is appreciated by carefully watching the evolution of the operation. The incision of the vaginal sulci, for example, as first suggested by Schuchardt, makes the time-consuming preparations of Emmet unnecessary.

The use of vaginal flaps in various ways from either the anterior or posterior wall, as proposed in 1890 and 1891 by Martin, Trendelenburg, Sänger, Fritsch, and others, marked the first step in advance over the classical operation. Although then considered the essential factor in success, this method is now regarded simply as an adjuvant to the principle of separating the bladder from the vaginal wall, first proposed by A. Mackenrodt in 1894. This is best done by beginning at the upper part in front of the cervix, making an anterior colpotomy incision, and thoroughly freeing it as high as the peritoneal juncture. In doing this, use may be made of any one of several details. The greatest credit should be given to Dr. Kelly for clearly presenting this principle to the American student. Without his descriptions of his own work and that of others, the writer feels he would have been unable to repair the cases just reported. The importance of this method as a principle rather than as a detail may be best appreciated by the fact that Dr. Kelly has shown that the upper and movable portion of the bladder may be simply sutured to the lower vaginal edge without closing the vaginal wall. Maze, H. Thompson, and Rothe have also demonstrated that if this principle is well carried out, the suture of the bladder-wall may be unnecessary. The same principle was partially applied by Dudley in his well-known case in which an area of the upper bladder-wall was denuded and sutured to the lower edge, thus reducing the size of the bladder and using the lower portion to fill in the gap.

The second important principle, also first suggested by Mackenrodt, of using the uterus, made movable by the dissection of the bladder, as an aid in closing the vaginal opening in some of the cases, is of the greatest value. Mackenrodt's own method of fixing the uterus in anteflexion, as in a vaginal fixation, is better replaced by that adopted by Küstner, Wol-

kowitch, and imitated by the writer, that of simply using the cervix by drawing the uterus down in a position of moderate retroversion. Freund's method of using the retroflexed organ drawn through an incision in the posterior fornix, and the more recent modification by Newman, of using the entire uterus pulled down in a similar manner and leaving only its sacral attachments, will not probably be generally adopted. Döderlein's suggestion of removing the entire organ also seems an unnecessary procedure. Since the adoption of these two principles, Ternowski has cured 90 per cent of his cases; Pauchet has been successful in 12 out of 13; Döderlein, in 12 out of 19.

All of the recent contributions to this subject are essentially the description of some minor modification in the details, which have little to do with the success of the operation in general. The suggestions of having the suture lines of the bladder and vaginal walls in different directions, or in not having them directly over each other, seem unnecessary when applied to the repair of the larger fistulæ, because it is only by the merest chance that they could be brought into the same line. Inversion of the bladder mucosa into the bladder and of the vaginal mucosa into the vagina, as recently proposed by Reeve, seems also an unimportant detail. Hausmann's idea of separately suturing the prevesical connective tissue will probably add little to the value of the operation.

The restoration of an extensively injured urethra, especially in conjunction with a similar injury to the bladder, still presents a difficult problem, chiefly for the reason, appreciated by the writer, that the injured urethra is too thin and narrow to be freely dissected from the vaginal wall. It is probable that the method suggested by F. Berndt, which was used by the writer, is the one capable of the widest application. The vaginal flaps can be supplemented by drawing down the mucosa surrounding the bladder opening so that, even if the urethral operation is not entirely successful, some power of retention is acquired. Numerous and ingenious methods have been tried. Wolkowitch, for example, bored a hole through scar tissue and pulled some of the vesical mucosa through the opening. Newman made a hole through the fundus of the retroflexed uterus, and created a fistulous tract into the cervix which projected into the bladder. The most extensive application of the flap-splitting method has recently been made by Sellheim, who successfully used a flap that extended from the labia to the upper part of the posterior vaginal wall, which was of sufficient thickness to include the ischicavernosus, the transversus perinei, and a part of the levator ani muscles.

## CONCLUSIONS

1. The basic principle in the repair of the large fistulæ is an extensive separation of the bladder-wall, especially of the upper part in front of the cervix, by means of which it is readily sutured to the more fixed lower portion.

2. The uterus, which has been made movable by the free dissection entailed in the separation of the bladder, or by an additional incision posteriorly in some cases, is a most valuable supplement in filling up the opening in the vaginal wall.

3. With these principles applied, it is a matter of little importance what kind of suture material is used, or what relation the vesical and vaginal suture lines have to each other.

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# THROMBOSIS AND EMBOLISM FOLLOWING ABDOMINAL OPERATIONS [1]

By JOSEPH TABER JOHNSON, Washington, D. C.

DR. KEITH of Edinburgh said, about fifteen years ago, when complimented on his splendid results in the removal of uterine and ovarian tumors, "that his success would be greater still if it were not for peritonitis"; that "it was peritonitis which beat us."

In those days it did beat us. In our improved surgical technique, nursing, and environments, we have very little fear of peritonitis in these days.

Lawson Tait remarked, about the same time, when complimented on his marvelous success in 138 abdominal sections without a death, that "the last word had not yet been said about ovariotomy"; that "a certain mortality of about two per cent would probably always attend these major operations, even in the best hands, due to accidents beyond the control of the surgeon, and about one per cent would be due to unexpected malignancy, thus leaving ninety-seven per cent of recoveries, when operated at the best time by the best men."

Thomas Addis Emmet has said that "it was the unexpected which most frequently happened in abdominal surgery."

Your attention will be briefly directed in this paper to one of the unexpected happenings, not exactly an accident, which unfortunately follows a certain small percentage of our abdominal operations, and which fortunately has more to do with their morbidity than with their mortality. I refer to those cases of thrombosis, chiefly of the femoral vein, from which an embolus is occasionally detached, and which may, and sometimes does, cause a fatal pulmonary cardiac or cerebral embolism. These conditions are not, as a rule, preventable, while they are known to follow more frequently in the wake of supravaginal hysterectomies for the removal of uterine fibromas, than in that of any other abdominal operations, with the possible exception of uterine suspension for the relief of retrodisplacement of the uterus. Femoral venous thrombosis may occur, however, during convalescence from perfectly aseptic minor gynecological operations, such

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as those upon the cervix uteri, vagina, or perineum, and they have been reported also as sequelæ of typhoid fever, pneumonia, and influenza.

All are, perhaps, most familiar with this complication from time immemorial, as it develops during the puerperium, and is described in text-books on obstetrics under the name of phlegmasia alba dolens.

At our Niagara Falls meeting last year, we had the pleasure of listening to a most elaborate and instructive paper on sudden death immediately after child-birth, or operations on the pelvic organs of women, by our distinguished fellow-colleague, Dr. E. P. Davis of Philadelphia. The sudden deaths reported in this paper, and in the subsequent discussion which followed its reading, were caused mostly by immediate pulmonary embolism or heart-clot, while the cases to which I wish to call your attention are of post-operative femoral thrombophlebitis, occurring generally between the second and third week of a perfectly uneventful convalescence, as a rule, and following, so far as could be determined, perfectly aseptic operations upon patients for the most part free from septic infections at the time of the section or afterwards.

According to Bosher of Richmond, in his report of seven cases of post-operative femoral thrombophlebitis, "if infection plays any part in the development of the lesion, this is seldom shown by other symptoms, for in most cases the wound heals aseptically, and the progress of the case prior to the appearance of the phlebitis is otherwise satisfactory."

Upon the causes as well as the condition itself, most of our modern text-books on gynecology and abdominal surgery are silent, Hirst being the only author who devotes any attention to this subject. He says femoral thrombophlebitis follows about three per cent of abdominal sections, that it occurs usually in the left leg, and that its ætiology is obscure; first symptoms are, pain in the calf of the leg and in the groin, the leg rapidly swells, becomes milk-white in color, and pits on pressure. In addition to bandaging and covering the affected limb, he recommends an application of unguentum Credé, ichthyol and glycerine or analgesic balsam along the course of the femoral veins, and absolute quiet until recovery, so as to avoid the quite possible occurrence of a fatal cardiac or pulmonary embolism.

Kelly has drawn attention, in his book on appendicitis, to the occurrence of pleurisy and pneumonia during convalescence from appendectomy, and traces their causation to small emboli detached from femoral thrombosis which occasionally follow this operation. He thinks we cannot give a positively favorable diagnosis in any abdominal operation until after the expiration of a month, on account of the possible and unexpected occurrence of femoral thrombosis from which a fatal pulmonary embolism may occur.

Davis, in the paper above referred to, gives as causes of pulmonary embolism producing sudden death after labor or pelvic operations, pre-existing infection, mechanical violence, altered conditions of the blood serum, and lesions of the walls of the blood-vessels.

The ætiology, however, of the form of thrombosis under consideration does not appear to be settled. There are two opinions held at present, which are directly opposed to each other. As Bosher states it, according to the first the lesion starts as a phlebitis due to infection at the time of the operation, while the second theory regards thrombosis due to traumatism as the primary lesion, which, in turn, is responsible for the inflammation of the vein. Those who adopt traumatism as the causative factor sustain their theory by reporting a series of operations in which a larger proportion of the perfectly aseptic cases had femoral thrombophlebitis than occurred in those previously infected.

Clark makes this contention, that injury to the epigrastic veins by retractors, holding open the abdominal incision during protracted operations, is the cause of the trouble, and in proof draws attention to his forty-one cases, in which he insists that infection could not have been the cause, inasmuch as in his long series of cases septic operations were not as frequently followed by phlebitis as were the aseptic ones.

In my own series of eight cases, there was infection at the time of the operation in only one that was noticeable, at least by the usual symptoms, and no other characteristic evidence

of the condition developed up to the time of the development of the thrombosis.

My own view of the causation in previously non-septic cases is partly that of Davis and partly that of Clark; namely, that the mechanical violence to the walls of the vessels which occurs at the site of the operation, and by the use of retractors, starts up an inflammatory process which gradually extends to the femoral vein, where thrombosis results in a certain unexplainable number of cases. Were traumatism the only cause, one might expect post-operative femoral thrombophlebitis in nearly all cases of difficult pelvic surgery. Were a pre-existing infection the chief cause, or infection introduced by the surgeon at the time of the operation, one might naturally expect phelebitis to follow in nearly all our septic cases. But it has been shown by Clark and others that exactly the opposite conditions most frequently prevail.

This is so much the case, that Cordier and others have given as the title of their papers on this subject, "Non-septic Thrombophlebitis" and "Thrombophlebitis Following Aseptic Operations"; "Aseptic Post-operative Femoral Thrombophlebitis," etc. That infection plays a certain role in the causation of some cases of femoral thromobosis is evident by their occurrence during typhoid fever, influenza, and other infectious diseases, such as pneumonia and post-partum infections. Steiner has reported forty-four cases of femoral thrombosis following pneumonia. The curious fact seems to obtain, that in a large proportion of these cases, no matter what the cause may be, the left leg is the one most frequently affected.

The anatomical theory insisted on by Clark and supported by Welch and Recklinghausen suggests a very plausible explanation. The epigastric veins so frequently mechanically interfered with by the retractors in use during most abdominal sections enter the femoral vein at an obtuse angle to the blood-current, thus giving rise to an eddying motion of the blood, which Recklinghausen advances as a most favorable condition for the formation of a thrombosis. Welch regards Recklinghausen's theory as a "valuable contribution" to our knowledge of thrombosis, and both he and Clark explain the occurrence of femoral thrombosis on the left side more frequently than on the right as being due to the more difficult return flow from the former, in consequence of the greater length of the left common iliac vein, its passage beneath the right common iliac artery, and probably to pressure upon this vein by a distended sigmoid flexure of the rectum.

This same causative influence seems to operate in those cases in which femoral venous thrombosis occurs in the course of the acute infections above mentioned, inasmuch as we find it nearly always developing in the left leg.

As the great majority of these patients recover, and as great difficulty has been experienced in procuring autopsies in those rare instances where death has taken place suddenly from the occurrence of pulmonary embolism in the course of the malady, few opportunities are presented for a bacteriological examination of the thrombi. Welch, however, is quoted by Bosher as directing attention to the fact that even the finding of bacteria in the thrombus would not necessarily prove its infectious origin, since this might well be due to an invasion of the tissues during the time immediately preceding death, as pointed out by Flexner in his article on terminal infections. At present we seem scarcely able to state definitely the causative influences which bring about these cases of post-operative femoral thrombophlebitis. That they appear more frequently after operations in the female pelvis than after operations in any other part of the body, is a fact on which modern writers on this subject generally agree.

Dearborn, in an exhaustive article in the *Annals of Gynecology and Pediatrics* for November, 1904, reviewed the work of twenty-five surgeons of Boston, in which this fact stood out very prominently, and he further states that it is quite possible that many cases of pleurisy, pneumonia, and pulmonary abscess following abdominal operations are due to emboli.

Dr. G. Brown Miller has recently published a paper on embolic pleurisy following these operations. The condition of the blood after severe hemorrhages, either before the operation for uterine fibroids or malignant disease

or at the time of their removal, undoubtedly has something to do in favoring the formation of both pulmonary and femoral thrombosis and embolism. Agnew and others have stated that "after operations in which much blood has been lost there is always more or less tendency to the formation of coagula," but this condition, I suspect, applies more directly to pulmonary than to femoral thrombosis, as in the latter condition a considerable loss of blood is not generally held to have any marked causative relationship. Dr. Wilmer Krusen, in a paper in the April number of the *American Journal of Obstetrics*, reported thirty-two cases of pulmonary embolism, twenty-two of which were rapidly fatal, following abdominal and pelvic operations.

Writers generally agree that there is little or nothing, so far, definitely known, or evident at the time of the operation, to lead to any suspicion that thrombosis or embolism is likely to occur in any given case; a considerable loss of blood is supposed to favor the coagulation of that remaining in the vessels, and should put us on our guard both as to management and prognosis.

While fatal pulmonary embolism occurs, as a rule, much earlier than femoral thrombophlebitis, they both make their appearance without preliminary symptoms, and practically render it impossible for us to pronounce a patient free from danger until at least a month has elapsed, from any abdominal or pelvic operation, especially in women.

Thrombophlebitis rarely shows itself until after the end of the first week, and in some reported cases as late as the fourth week, and usually in the left leg. One of Bosher's cases occurred on the thirty-second day after operation, and in several after leaving the hospitals.

In Clark's cases this leg was affected twenty-five times, the right leg eleven times, and both legs five times. In cases where the operation has been on the right side, the left leg is the one usually thrombosed. This was noticed in four of Clark's cases.

In two cases reported by Willy Meyer, the left leg was first affected, and upon its restoration the right became involved also.

In four cases reported by Vander Veer, the left leg *alone* was involved. In my own eight cases, the left leg was affected first in each instance, while in two the right was subsequently attacked.

In none did the trouble appear earlier than the second week, while in one fatal case, after apparent recovery, while the patient was getting ready to leave the hospital, very sudden pulmonary embolism came on, and she died in a few moments from the onset of her first symptoms.

There is little to be said in regard to the diagnosis, prophylaxis, or treatment. Having its possible occurrence in mind after any abdominal or pelvic operation, we should find no difficulty in differentiating it from rheumatism, neuralgia, or any other complaint.

Increased aseptic precautions might lessen their possibility, on the theory of its infectious causation, and greater care in the use of retractors, protecting the soft parts by gauze pads under these instruments, might lessen the danger of traumatism to the epigastric veins, suggested by Clark.

Patients, especially those who had lost much blood or had been transfused, might be kept a longer time more quietly in bed, and the unobstructed and easy return venous circulation facilitated by the elevation of the foot of the bed immediately after operation.

The treatment, according to Bosher and others, is largely negative. Palpation is to be performed only when absolutely called for, and then with the greatest care, on account of the possibility of dislodging a portion of the thrombus, and thereby causing pulmonary embolism.

Complete rest in bed, elevation of the limb, enveloping the affected leg in cotton held in place by a lightly applied bandage, will usually result in complete recovery in two or three weeks without suppuration.

Some surgeons recommend the application of mercurial and belladonna ointments, but there is some doubt if the manipulation required might not result in more harm than good.

The patient should not be allowed to make much muscular effort for some time after the complete subsidence of all local symptoms. The "wearing of an elastic stocking is recommended during convalescence, as likely to give

support to the vessels and add to the comfort of the patient."

We have then, Mr. President, in post-operative femoral thrombophlebitis, an unexpected and unpreventable complication to our abdominal and pelvic operations, which adds at least three per cent to their morbidity. In pulmonary embolism, which seems to be equally unexpected and unpreventable, and which may in the late cases be a sequela of femoral thrombosis, we have an uncertain mortality quantity to deal with, which, until we learn better how to prevent, will detract from our ability to prognosticate a cure, in the most simple aseptic cases even, for at least a month.

CASE 1. Mrs. W., white, aged 35 years, was operated on in October, 1890, for the removal of a large fibroid tumor of the uterus, by supravaginal hysterectomy. She did well for two weeks, when she began to complain of pain in the left groin and in the calf of the leg; the entire leg soon became swollen, the skin was tense and milk-white, and pitted on pressure. At first she was thought to have rheumatism. The femoral vein, upon examination, was found to be painful, hard, and the leg was colder than its fellow. A diagnosis of milk-leg was made. It was clearly a case of thrombophlebitis. The patient was free from sepsis at the time of the operation, and the wound healed perfectly. The stitches were removed on the eighth day. The leg was wrapped in cotton, lightly bandaged, and slightly elevated. In a week the pain and swelling began to disappear, and in another week the patient was sitting up. She left the hospital six weeks after her operation, wearing an elastic stocking. She made a good recovery, and has since been well.

CASE 2. I operated on the unmarried sister of Mrs. W. also, in my hospital, for uterine fibroids. She also had left femoral thrombophlebitis coming on at the end of the second week. Her symptoms, treatment, and results were the same as in case 1. No apparent sepsis at time of operation. Perfect healing of wound, not having even a stitch-hole abscess. Both sisters were anæmic from loss of blood, on account of their fibroid tumors previous to operation, which condition may have contributed to their femoral thrombosis.

CASE 3. Also a supravaginal hysterectomy for fibroids. Operated on Miss R. in January, 1897, aged 29, also in my hospital. She had the tumor removed on account of pressure symptoms and hemorrhages. The history of this case was almost a repetition of the two above described. Her convalescence was retarded at least two weeks by this complication. She has been well ever since, and complains of no trouble whatever at the present time.

CASE 4. Was sent to me by Dr. J. R. Bromwell. Mrs. O., aged about 50, mother of several grown children. Removed an eight-pound uterine fibroid by supravaginal hysterectomy, in my hospital, in February, 1900. No especial difficulty was experienced during the operation, very little blood was lost, and the patient did unusually well until the fifth day, when she began to complain of unusual pains in her legs, and oppressed breathing. She wished to change her position in bed often. During a visit from her physician on same day, upon a repetition of her request we arranged her pillows, and lifted her into a half-sitting posture, which made her feel more comfortable. She asked for a glass of milk, and while drinking it from her own hand and talking to us pleasantly, she suddenly called out to us that she could not see, and asked the doctor to take the half-emptied glass. We at once placed her flat in bed with her head low, thinking she was about to faint on account of the elevated position. Her mind became confused, she complained of pains in her head, difficult breathing, and choking sensations. She soon became unconscious, and her family were at once notified, and all came immediately. She did not recognize them, and died within two hours of the beginning of her attack. Nothing that we did was of the slightest benefit, and we could offer very little explanation to the shocked and sorrowing group of relatives. No post-mortem was allowed. On account of the pain in her back and limbs, we arrived at the theory that a femoral thrombus was forming, and that her change from a recumbent to a half-sitting posture caused the detachment of emboli which found their way through the circulation both into the cerebral and pulmonary vessels, causing the symptoms we witnessed of cerebral and pulmonary embolism.

In pulmonary embolism alone the patient usually retains her consciousness to the last.

In this case the patient was unconscious almost from the first, but as long as she was able to speak, complained of the usual symptoms of pulmonary embolism also. The progress of the patient up to the time of her seizure was as favorable as could be desired.

CASE 5. Mrs. X., wife of a farmer living in Virginia, was sent to my service in the Georgetown Universit Hospital on the tenth day of May, 1902, and was operated on three days later. She did well until the middle of her second week, when she developed a slight left femoral thrombophlebitis. The calf of her leg was swollen and painful, and the femoral vein could be felt under the skin about the size, length, and hardness of an ordinary lead-pencil. It was not as sensitive as the average case. Her symptoms under the usual negative treatment soon disappeared, and she was up and walking about the ward during her fifth week without pain or inconvenience of any kind. She was preparing to leave the hospital with her husband at the end of her sixth week, restored, as she thought, to health, and very grateful and happy.

Her bag was packed, and she was sitting on the side of her bed, laughing and joking with the other patients, eating a piece of pie as her dessert, which she held in her hand like a school-girl, when she suddenly dropped

the pie, clasped her hand over her left chest, gasped for breath, and, notwithstanding all that was done for her, in less than an hour she died with all the characteristic symptoms of pulmonary embolism. No post-mortem could be obtained.

CASE 6. Was a single lady about 50 years of age. I had operated on her twice before; once for the radical cure of coccygodinia by the removal of her coccyx, and secondly for the removal of what turned out to be a non-malignant tumor in her breast.

Later on, Dr. Halsted of Baltimore came over, and removed the other breast for what turned out to be a benign growth also.

This time her troubles were caused by a bleeding fibroid, and though she was in good flesh, she was quite pale and anæmic. Her hæmoglobin was so low that we would have postponed her operation until it could be improved by appropriate diet and treatment while at rest in Providence Hospital, where she had a suite of apartments and two special nurses, but for the fact that she was losing much more blood every month than she could possibly make up, on account of the irritating pressure of the fibroid tumor.

On October 5, 1905, Miss E. was subjected to a supravaginal hysterectomy, which she bore very well. On the fifth day she began to have an evening rise of temperature, and in the subsequent week a number of blood examinations demonstrated the presence of typhoid fever. There was perfect healing of her wound, and no tenderness about the stump existed, nor were there any symptoms usual in sepsis or peritonitis following hysterectomy, and there were numerous and unmistakable positive Widal tests.

During her third week in bed she developed a left femoral thrombophlebitis, which ran its usual course, and by the time her fever had disappeared her leg gave her no further trouble, except to swell when she first began to sit up and walk about her room. This was corrected by the wearing of an elastic stocking. The patient left the hospital at the end of two months, and has since been well.

If ever there was a case where one might expect a pulmonary embolism, it would seem that this was the one in which it might occur. Her past history and recent illness would all suggest its possibility, if not probability. Her enforced long rest in bed may have been a blessing in disguise.

The last two cases are rather pointed illustrations of Emmet's suggestion that it is the unexpected which often happens in pelvic surgery.

CASE 7. Was sent to me by Dr. H. H. Barker, and operated on in May, 1905, in the George Washington University Hospital, for the removal of an intraligamentary ovarian cyst on one side, and an adherent pus-tube on the other. Both the cystic tumor and the pyosalpinx ruptured during their removal, and the pelvis was deluged with foul-smelling fluid and pus before the evacuation of these pus-sacs was completed. Drainage was opened up through the posterior cul-de-sac into the vagina, and several pitchers of hot salt solution were used in the washing-out process, which escaped through the vagina. As the oozing could not be arrested by ligatures, the pelvis was packed with several yards of sterile gauze, one end being brought out through the vagina, and the abdominal wound closed completely. The patient had been badly septic for two weeks preceding the operation, as shown by irregular chills, sweats, daily rise of temperature and pulse in the afternoon, and confinement to bed.

The gauze was ten days in all coming away. Its gradual removal was accompanied by a horrible smelling foul discharge, and the pelvis was irrigated with hot boracic solution for another week.

We had all the causes combined present in this case for a thrombosis of any or all kinds, and we finally got it, but not until the end of the fourth week. We had pre and post operative infection, we had any amount of traumatism, and we had the pressure of the gauze packing for a week, added to that of a distended sigmoid and obstructed rectum. She left the hospital in her eighth week and gradually regained her health, and has been perfectly well for the past six months, and is now.

In would be difficult to say which of the variously stated causes produced the post-operative femoral thrombophlebitis in this case.

CASE 8. In October, 1904, I operated on Miss G. for the relief of a bound-down retroversion. The operation was a ventral suspension. The edges of the wound were held open by retractors, and the patient did well for ten days, when a left femoral thrombophlebitis developed. This was treated in the usual way for another week, after which the pain and swelling gradually disappeared in the left leg, and appeared in the right. This kept her in bed for another week. She left the hospital at the end of her sixth week, wearing two elastic stockings, and, so far as I know, has continued well ever since.

# RESULTS OF VAGINAL SECTION AND DRAINAGE IN EARLY CASES OF ECTOPIC GESTATION[1]

By WILLIS E. FORD, M. D., Utica, New York

THE interest in the subject of extrauterine pregnancy has diminished very markedly since the profession has agreed upon its proper management and since the technique of the operation has been perfected. My interest has been revived by the fact that during the month of April of this year two rather serious cases have come to me, and I have taken the trouble to investigate the question of the early diagnosis of this condition, and the treatment by vaginal incision and drainage of my own cases. There is no intention of discussing the general subject of ectopic gestation in this brief clinical report, or of advocating anything but abdominal section for ruptured cases, but simply to give the results of treatment in the few cases of unruptured tubes that I have operated and have been able to ascertain the result after a year or more. The case that has interested me most and has caused me to present these clinical observations I shall take the liberty of briefly reporting.

In 1897, a woman, aged thirty-six, American, twice married, came to the hospital with a moderate-sized pelvic tumor that fluctuated and seemed to be either a very large salpingitis, or a pelvic abscess the result of a salpingitis. She had a history of three miscarriages and one labor at term, but the child died in two hours. Three months previous to her admission to the hospital, she had missed her regular menstruation and had experienced sharp pain for the first month or six weeks, and then had fainting spells, but during this time she had practically no medical care. She had a slight uterine hemorrhage and a few shreds, with the general history of extrauterine pregnancy up to the time of the tenth week, when she had sharp pain, chills, and fainting. It was two weeks after this (which was the probable time of the rupture of the tube) that I opened the vagina through the Douglas cul-de-sac and passed my finger into the opening. A terrific hemorrhage followed, but fortunately the opening I made in the sac was so small that I was able partially to control the bleeding with the finger in the sac, and then to pass iodoform-gauze over my finger into the sac until I had stopped it. There was subsequently a watery drainage; the tampon was left for six days, and then appreciating the danger, ready for an abdominal section in case of a bad hemorrhage, I removed the gauze. In doing this I had another sharp hemorrhage of such magnitude that the woman instantly collapsed, and she was tamponed again with gauze, because it could be done more quickly than the abdomen could be opened, and she revived and went on to a recovery.

I have never seen any hemorrhage so serious, and made up my mind that I would not do any more vaginal sections for ectopic gestation. The case made such a good recovery afterward, and the mass so thoroughly disappeared, and everything seemed so normal, without adhesions, that I subsequently tried twelve cases that I have to report.

In April of this year, this same patient returned to the hospital with a history of miscarriage that had not been cared for, which was followed by a uterine hemorrhage lasting for six weeks. She had miscarried at the third month. The uterus was open and some afterbirth was curetted away, without ether. In doing so I discovered a pelvic tumor, egg-shaped, attached to the posterior vaginal wall, and holding, perhaps, a quart of fluid, which I opened and drained. The sac of this tumor was attached by scar tissue to the vagina at the site of the former incision. The fluid it contained was straw-colored. On the collapse of the tube I continued drainage for a few days, and the woman went home well. She refused to have an abdominal section for the removal of this sac. It seemed to me that this last tumor was the result of the unremoved sac of the former ectopic gestation, and that if I had done an abdominal section at that time she would have been saved any further trouble. It was this circumstance that prompted me to look up the record of the twelve cases of extrauterine pregnancy that I have operated by vaginal section, with the view of ascertaining what condition followed in the other cases, and therefore whether even a successful vaginal incision was justifiable for this trouble. In this year (1897) I was very much interested

[1] Read before the American Gynecological Society, Hot Springs, Virginia, May 24, 1906.

in the question of vaginal section, and operated five cases in this manner.

The fact that the diagnosis of extrauterine pregnancy may usually be established by the general practitioner in the early history of the case, makes it possible to do a radical operation before a rupture and the consequent danger to life. The records of this society show that since its beginning there have been twenty-five articles on extrauterine pregnancy presented by its fellows. On examining these articles, one is struck with the fact that in very few instances, especially in the early days, even after it was well recognized, was the diagnosis made until rupture had occurred. If rupture occurred in the majority of cases somewhere near the twelfth week, it is not strange that in those days so few cases are recorded of advanced extrauterine pregnancy, and almost none in which the fœtus has gone on to development as long as the fifth or sixth month, or even longer. Many cases are reported in the early volumes of our transactions, in which such time had elapsed before any operative interference had been made.

Since 1897 I have had but one case where the pregnancy was well-defined extrauterine pregnancy, that had gone on as far as the sixth month. In this case, however, the sac ruptured at the third month, and the woman came near dying from shock and hemorrhage, and went on to a condition of mild sepsis, which had lasted nearly three months when I saw her. The early history of this case was characteristic of ectopic gestation, and would hardly have escaped the attention of an ordinary physician.

This woman was the wife of a very poor man, a German, who supposed that she had consumption, and the doctor who had seen her had given her very little attention. When I operated her she was feeble and exhausted, and I opened through the vagina, emptying out pieces of bone and as much as three quarts of septic material. She made a good recovery, and two years afterward was found to have a movable uterus, without any evidence of any serious trouble in the pelvis, and therefore satisfied me that septic cases seen a long time after rupture could be managed in this way, perhaps, as well as by abdominal section.

In the twelve cases that I have to report there is nothing very striking in any of them, excepting one, which I shall later take the liberty of briefly reporting. They were all seen before complete rupture had taken place, and some of them as early as the eighth week. In all cases the incision was made most cautiously into the sac, the finger being used to open into it, and the contents examined before the finger was wholly withdrawn, so as not to lose the landmark. In no case was all the blood emptied at the time of the incision, but gauze was carefully passed into the opening and very firmly packed, so as to prevent hemorrhage, and allowed to remain for a week before removal. I believe that in this way hemorrhage is avoided, and the operation is satisfactory in its results.

When I am not certain as to the nature of a small mass lying close up to the uterus, it has been my custom to be sure that the contents of the sac was not blood, before I have allowed free evacuation of the mass. If the finger is once taken out of the opening, it is extremely difficult, in the presence of hemorrhage, to find the one opening in the sac that you want, for the purpose of putting in a tampon quickly enough to control a hemorrhage. None of these twelve cases were operated after the third month. The diagnosis in most instances was made comparatively certain before the operation, and was verified afterward by the presence of chorionic villi. In two of these, pregnancy occurred since that time, with a normal delivery and a living child. No miscarriages have been reported in any of the cases, and in none of the twelve has there been any pelvic disease, nor is there any at present apparent. Menstruation has been normal, and there has been perfect health.

In one case that was sent to me last year for operation for ectopic gestation, I made the error of confirming the diagnosis mainly on the history, though the physical examination showed a mass close up to the uterus on the left side, which seemed to me larger than an extrauterine pregnancy of two and a half months should be. There was found in the scrapings from the uterus some membrane containing placental remains. After curetting, all the symptoms ceased, excepting the pain in the

left side over the tumor. This tumor I removed by abdominal section, and found it was a dermoid cyst containing a roll of hair about as big as an orange. This patient remained well until April of this year. She was a woman of twenty-eight, who had been trained as a nurse, and had been married about two years, and after her operation resumed her work as a nurse. Her period did not come on the 1st of April last, and her physician examined her and found nothing wrong, and said that she was not pregnant, but the delay was due to some trivial circumstance, and she went on with her work. In a few days she began to have a slight discharge of blood, and ten days later, while at her work, she had a sharp pain which lasted four hours, accompanied by profound shock, and followed by the presence of a slight mass in the right tube, discovered for the first time by her physician. She returned home and remained in bed, and had a very slight uterine hemorrhage most of the time, and on the 3d of this month had another sharp attack of pain, with collapse, from which she did not speedily rally. Her pulse became more rapid, and her temperature ran up to 101°. On the evening of the same day I saw her. She had a very rapid, feeble pulse, and a doughy mass in the pelvis, and every evidence of profound hemorrhage from a ruptured ectopic gestation. This was only four weeks from the time that she should have menstruated regularly and failed to do so. I opened the abdomen under very unfavorable circumstances, in the night, and, practically without any light to guide me, clamped the broad ligament (I could not put on a ligature) and removed the mass, and tamponed the cavity, leaving the opening to drain. She has made a good recovery.

A small dermoid cyst close down to the uterus which causes pretty sharp pain feels a good deal like a distended broad ligament, and might easily mislead one in making an early diagnosis of ectopic gestation; but I can hardly think of any other circumstance that would do so, if a fair history of the patient can be obtained. Therefore I believe that the early operation, before rupture of the tube, can generally be made, and that the physician in charge of these cases should now be sufficiently familiar with the signs and symptoms of this disorder to recognize the condition, and call the attention of the surgeon to the matter before rupture has taken place.

The fact that the cases operated early leave almost no trace of anything wrong in the pelvis afterwards, and that the operation is so safe and so certain in its results, has impressed me that this society should urge early diagnosis and early operation of all cases of extrauterine pregnancy.

Is it possible that the profession is becoming so enamored of technique that it is losing the advantage which can be secured by obtaining a rational history that would point toward possible danger before an expert is called? Expertness with the fingers that may give a good technique should not overshadow that mental expertness which will enable the general practitioner, by carefully eliciting the rational signs of sickness, after an exhaustive history has been obtained, to come to a fairly correct opinion.

Expert operators are not the ones who first see the cases of extrauterine pregnancy. A correct physical diagnosis is of the utmost importance in surgical matters, as well as in purely medical affairs; but it is not always possible to secure this by the men who first see these cases.

Inexpert physical examination may lead a man much further astray than if he relied upon the subjective symptoms.

If the teaching in the schools could be so modified as to impress upon the medical students a more careful consideration of the subjective symptoms until skill enough has been acquired to enable the verification of the diagnosis to be made with certainty, I am sure that these cases of ectopic gestation would be seen early enough to be operated, and thus prevent rupture and hemorrhage in a larger number of instances.

# A REVIEW OF THE SURGERY OF THE FEMALE PELVIC ORGANS[1]

By S. C. GORDON, M. D., LL. D., Portland, Maine

To one familiar with the surgery of the female pelvic organs for the last twenty years, it is apparent that many changes have taken place, and the present seems a timely period to "take an account of stock," to use a commercial term, and find where the consensus of opinion lies, as between what was known a score of years ago as the "radical" surgery, and what has been known within the past ten years as the "conservative" surgery of these organs. The prime object of all surgery is to cure the patient; "for this are we doctors," and especially for this are we surgeons; and we but illy answer the demands upon us as professional men unless we bring to our work in this direction our best efforts towards giving to our patients not only the most skillful technique in surgery, but our best judgment as to the pathology, and the still more important factor of what portion shall we remove of diseased tissue, in order that our patient may recover, wholly or in part, a normal condition of health which had been impaired by the abnormal condition of the pelvic organs.

The young surgeon, beginning his work twenty or twenty-five years ago, found the prestige of such names as Battey, Tait, Hegar, and many others in favor of removal of the uterine adnexa for various symptoms that were believed to be due to the ovaries and tubes while still in the normal period of functional life. None of us who knew these men doubted for one moment their honesty and sincerity, or questioned their ability to investigate properly pathological conditions, and deduce logical sequences from the relation of such pathological conditions to the train of symptoms found in any given case. In America, no one had the confidence of the entire profession to a greater degree than Battey, a man of unimpeachable integrity and indefatigable industry, who brought to his work an unprejudiced mind and a close observation of every detail before advising operative measures. He found many of the intense reflex symptoms, such as hysteria, insomnia, faulty digestion, and a long train of neurotic symptoms, traceable to disordered menstrual function; and believing that an artificial menopause would, in time, effectually remove these manifold ills, the operation of what was erroneously called normal oöphorectomy was done. That this operation was, in the highest degree, beneficial in most cases, and entirely curative in a very large percentage of cases, in the experience of Battey, there is no reasonable doubt in the minds of his contemporaries. His reports from year to year were characterized by a fairness of statement as to cures, relieved, and absolute failures. His conservative estimates as to the applicability of the operation, and results to be expected from it, were models of medical literature in comparison with those of many men of far less experience, who operated without the care and skill necessary to a proper understanding of the principles so modestly enunciated by Battey. Had the operation been done only by men who had been faithful disciples of Battey, much fewer failures would have been recorded, and much less bitter criticism would have been indulged in by members of the profession who had absolutely no experience, and judged only from many of the cases that never should have been operated at all. Another and a very grave error, and one which tended to bring the operation into disrepute, was the promises made to the neurotic class of cases, as to prompt and early relief to symptoms under which they had suffered. While the pathological condition and urgent symptoms were in the relation of cause and effect, sufficient allowance was not made for the time necessary for the complete restoration to health of a system which had been impaired by long continued suffering. Pain, insomnia, malassimilation, had wrought such changes in the nutrition and nerve centers, that time only could complete the cure, even after the cause was removed. The effect does not always promptly follow removal of the cause. Ultimate recov-

[1] Read before the American Gynecological Society, Hot Springs, Virginia, May 24, 1906.

ery in many of these cases illustrated the truth of this. Failure to recover according to promises led many patients to declare that the operation had been of no benefit to them, thus discouraging others, to whom it would have been of incalculable value in the hands of a competent gynecologist, who would have been less profuse in promises and much more discriminating in choice of his cases for operation. The "craze for operating" took possession of the surgical world, and every young man ambitious for renown in this fascinating department of medicine "fleshed" his maiden knife in the abdomen of some confiding victim to inexperience and immature judgment. Another, and in my opinion very potent, cause of failure to effect a satisfactory result lies in the fact that in removing the adnexa the uterus was not removed. This is a question which is to some extent still *sub judice*, inasmuch as men of large experience believe that it is unnecessary, claiming that no organ should be sacrificed that can be avoided. Many of these cases of removal of the ovaries had more or less pelvic exudate, which kept up a state of chronic passive congestion; other cases had varicose veins of the broad ligament, which induced the same condition, causing pain and a feeling of weight in the pelvis, with local and reflex symptoms that made her a constant invalid. In nearly all these cases the uterus had the same complication, and remained a source of future trouble until removed. In many instances the uterus was the point of infection, and still remained a nidus for future attacks of inflammation or congestion. Too often the infective germ was either a streptococcus or gonococcus, which does not become sterile so readily as the other forms. Aside from all these considerations, the fact exists that the uterus, after the ovaries are removed, is an entirely useless organ, having no function whatever, and having the uterine artery pumping blood into it from each side, while the varicose condition of the broad ligaments prevents a prompt and normal return of blood through them.

I have never yet found a gynecologist or general surgeon who has been able to give other than a purely sentimental reason for leaving this useless bag. There certainly can be no scientific or logical reason for it. With all the pelvic organs in place and in normal condition, the principal function of the uterus is providing for the proper development of the fœtus and its gestation until parturition takes place. On the contrary, removing the uterus and leaving a part of one or both ovaries has been found more or less beneficial; at least, this is quite generally believed by many of the most experienced gynecologists and general surgeons. In fact, this was one of the first steps in the so-called conservative gynecology. It is believed that retaining the ovary or ovaries supplies something in the human economy which tends to limit the nervous disturbance which follows in some of this class of cases. Another reason for complete hysterectomy is, that, in a small percentage of cases, menstruation is kept up after the oöphorectomy has been done. It was first believed that this was due to an imperfectly performed operation, and that a small portion of one or the other ovary must have been left behind.

Dr. Arther Johnstone of Cincinnati (recently deceased), after much experimenting upon the lower animals and observation of cases where menstruation followed oöphorectomy, propounded a theory that the seat of menstrual function lay at the horn of the uterus, and that if the tube was removed so close to the uterus as to include a portion of the cornua, the function must cease. To a certain degree it was theoretical, which could not actually be demonstrated. It was also believed by Tait and others. My own practice for many years has been to remove the uterus whenever for any cause I was obliged to remove the ovaries, and the result has fully justified the action, in comparison with former results, where I did not do it.

The unsatisfactory condition remaining after so many operations for so-called oöphorectomy, due to the various causes named, decided several prominent gynecologists to adopt a different method of treating these organs, where the operator fully believed the symptoms found were due to diseased adnexa, and the period of "conservative gynecology" began. Foremost in this work were A. P. Dudley and

W. H. Polk of New York, the former having done an immense amount which has recently been presented in a very voluminous report at the International Medical Congress at Madrid, in Spain, two years ago. In more than a thousand cases he carefully noted the condition found and his methods, and as far as possible giving results, which in quite a large percentage of cases were very satisfactory. Dr. Polk, in a smaller number reported, made equally encouraging statements as to cure of symptoms and gratifying relief from suffering. Of course, this work was largely experimental, and the early reports were so announced, as time alone could determine what was to be the ultimate value. The prime object of this "conservative" work was to conserve organs, or parts of organs, so far as they believed it to be consistent with the future welfare of the patient. Had the profession generally waited until these men and some others could have time to verify their experience by close observation of their cases, much more good and much less harm would have come out of it. But in this experiment, as in that of "normal oöphorectomy," every one was desirous of doing something for himself, and the same or similar fruits followed. "Resection of ovaries and tubes" became the fashion, and, regardless of the pathological condition, the operation was done by men who had not even had a "six weeks' course" at a post-graduate school. This was much more disastrous than complete removal in many instances, and the last condition of that woman was infinitely worse than the first. The reason was not at all difficult to find. It is well known that the infective germ in diseased adnexa is frequently the gonococcus or the streptococcus following abortion (criminal or otherwise). It is also well known that any attempt to operate upon such a condition until the germs are sterile is almost sure to awaken a fresh acute attack of inflammation, resulting in death or extensive adhesions. If allowed to remain undisturbed until time can sterilize the pus, the opening of new tissue can be done with impunity. A careful history of the patient, before deciding to operate, would have saved the operator subsequent mortification and the unfortunate woman a lingering invalidism or future abdominal section. The difference between a case of this kind and one where a much less virulent germ was the cause make the difference between absolute cure and a far worse condition than existed prior to the "conservative" operation. To a surgeon familiar with one of these cases by actual operation, in a second abdominal section it is painfully apparent wherein the fault lay. Within a few months I have had a case in point where a "conservative" operation had been done nearly three years before, where a more careful inquiry would have proven that the cause was of gonorrhœal origin. The pelvis was an almost solid mass of adhesions, with an adherent omentum covering the whole. The woman had been a sufferer during the entire period covered by the three years. This is only one of many seen by surgeons familiar with pelvic troubles. The operation done primarily was removal of one ovary and resection of the other. The variety of operations under the name of conservative are numerous, and depend entirely upon the inventive genius of the operator. A glance at the list of surgical operations of any large hospital will show the extent to which it is carried. Most of the patients are so scattered that few of them can be followed to learn the results. Dudley and Morris each transplanted an ovary into the middle of the body of the uterus, where the tube had to be removed form that side, and the ovary and tube of the other side was also sacrificed. Menstruation followed for many months, but no pregnancy took place, as was hoped for, and principally for which the operation was done. The woman was a prostitute in this case, and was a patient of Dr. Dudley's. Morris has never reported pregnancy, to my knowledge, under these circumstances. That these "conservative" operations have fallen far short of the hopes of the pioneers, is beginning to be sadly realized, and yet there is no doubt that they have done an incalculable amount of good in relieving suffering and rendering many women fruitful that had been sterile for many years. They have satisfied the sentimental objection, that so many women have, against losing the function of menstruation, even though attended by extreme suffering. That doubt exists as to the future of these operative measures is shown by the

fact that one of the subjects selected by the council of the American Gynecological Society for discussion at this meeting is entitled "Immediate and Remote Results of So-called Conservative Operations on the Uterine Appendages, Ovaries, and Tubes." The discussion of the subject will undoubtedly bring out the experience of the men who have been doing much of this kind of work. My own experience and observation lead me to the conclusion that in a great many cases the operation has been conservative of organs rather than of health, which is the sole object for which the woman seeks our advice and skill.

The treatment of fibroids of the uterus is still a live subject for discussion, and men are divided upon the question as to how far myomectomy shall usurp the place of hysterectomy. Hegar first propounded the theory of oöphorectomy where the uterus contained one or more fibromas, hoping that an artificial menopause would stop the growth and gradually result in absorption. In his time the theory that the normal menopause generally accomplished this was believed in to a much greater extent than now. Facts have not justified the theory. That myomectomy has proved successful in many cases has been shown by repeated reports from some of the noted gynecologists of the world, notably in our own country. Especially is this true when a single tumor was easily accessible, either by the vagina or abdominal section, but for multiple tumors involving both body and cervix it does not appeal to common sense or scientific theory. For young women of child-bearing age, and who are anxious for offspring, we are justified in carrying it to the extreme limit, but beyond this I am sure that the consensus of opinion is decidedly in favor of hysterectomy. Small fibroids may exist in a uterus where one or more have been removed, that are almost certain to prove sources of future trouble, and may require a second abdominal section. I can see no good reason for conservatism of such organs at the expense of good health. I have seen no cause for changing my views on this point since my paper read before the American Gynecological Society and the Maine Association, and published in the transactions of each. It was a reply to a paper by Howard Kelly, presented the year before, at the meeting of the Gynecological Society. When we take into account the various forms of degeneration that may occur in the tumor, the inflammation that may arise in consequence of infection through the uterine canal, the well-known influence upon the heart, both as to fatty degeneration and hypertrophy, we shall not hesitate long as to where true conservatism points us in a surgical line.

I fully believe that, all things considered, with the exceptions named, a woman suffering from a fibroid of the uterus to the degree of requiring the services of a physician had better have hysterectomy. I am sure that this opinion represents the best judgment of the best men of this country. When the woman finds herself in the condition above named, she begins a period of invalidism which will continue indefinitely until the cause is removed; which is a diseased uterus. The days of electrical treatment for fibroids have passed, and the names of Apostoli and Keith (who renounced hysterectomy for electricity, and died a disappointed man) will be remembered for the other deeds their bearers did, rather than for any great good with the electric current. I regret to say that hundreds of practitioners are still continuing its use, even since it was given up by Apostoli. Drugs are now abandoned, except as a temporary expedient for hemorrhage; so we may safely say that surgery offers the only relief for myofibroma of the uterus, and that hysterectomy is the ideal operation for permanent cure. All others are excuses for doing something, while some of the remedies offered are even dangerous. Cancer of the uterus, as it ordinarily comes under our notice (too late), is now best treated by curettement and cautery, as taught so long by Dr. John Byrne of Brooklyn. The efforts of the profession to-day are to encourage careful investigation, so that the disease may be diagnosed in the early stages, when hysterectomy may be done easily. Delayed hysterectomy for cancer has been very unsatisfactory, and in many cases has shortened life, so I believe I represent the consensus of the gynecologists of to-day when I say that to Byrne belongs the credit of having had better results than any published in medical literature.

Surgery for uterine displacements holds a very high place in the practice of the foremost men in the special work of diseases of women. While there are a variety of methods for securing the result of permanent fixation, or permanent relief to the displacement, the plan which supports the uterus by the round ligaments seems to meet with more favor than ventrofixation, which has been found to have many disadvantages. The Alexander-Adams operation is applicable to cases only where there are no adhesions, so that for several years I have done what is known as the Gilliam-Cousins fixation, which consists in bringing a loop of the round ligaments up through the abdominal fascia on each side of a median incision and stitching it to the fascia and closing the skin incision over it. The uterus does not touch the peritoneum, but swings by the round ligaments. Several cases operated by this method have become pregnant and passed through safely, while those operated by the former methods of suspension have had more or less trouble. From my own experience and that of others, I am of the opinion that this is a much better method than any heretofore devised. Something may come that will prove better. The operations through the vagina, such as that of Mackenrodt and the shortening of the uterosacral ligaments, do not appeal to a majority of gynecologists of the present day.

Acute attacks resulting in pus in the tubes and ovaries should always be opened through the vagina and drained for a day or two by rubber tube. The matter of drainage has undergone a great change in a few years. For many years I have avoided abdominal drainage almost wholly, believing that it has very little value. If there is any fault in technique, and infective germs are left in the pelvic cavity, no form of drainage will remove them. An exudate surrounds all forms of drainage, even in a few hours, so that nothing beyond the immediate tube or gauze is removed Twenty-four hours (except in case of a large abscess cavity) is all that is necessary to accomplish what can be done by drainage. A recent article in SURGERY, GYNECOLOGY AND OBSTETRICS represents what I believe is the best sentiment on this subject. It is a prize essay, and discusses every known form of drainage. It is by Dr. Yates of Chicago. He shows by repeated experiments that even in six hours the meshes of gauze become filled with the surrounding tissue, completely shutting off all discharge, while a certain amount of the plastic elements surrounds the enmeshed tissue, as well as a rubber or other kind of tube. In a discussion of this question at the meeting of the American Medical Association in Detroit, twenty years ago, I contended that such a condition existed as above described; therefore that drainage in abdominal surgery was practically of no use. The general sentiment, of course, was adverse to this, but fifteen years later some of the very men who took issue with me acknowledged that the position was right and that they had entirely changed their practice

The conclusions of this hastily prepared paper may be stated as follows:

1. That the Battey operation was one that did an immense amount of good in the practice of men of experience and skill in operating; that the results in many cases were often delayed, for obvious reasons; that, undoubtedly, much more harm than good was done, because of inexperience in pathology and operative skill.

2. That the so-called "conservative" gynecology in too many instances was but a conservatism of diseased organs, in whole or in part, and not conservative of the health of the patient.

3. That the sentiment is already changing from this extreme conservatism to more careful consideration of the future condition of the patient, as instanced in a more general belief in hysterectomy for fibroids of the uterus instead of myomectomy.

4. That in resections of the adnexa, regard should be paid to the history of the cause of the infection, rather than to the macroscopical condition, as the virulent germs produce changes that require total removal, together with the uterus, as the only safety to the patient.

5. That in malignant disease of the uterus, efforts should be made to discover it early, when panhysterectomy may be done to advantage. Advanced cancer must be treated tentatively, by curettement and actual cautery.

The extremely extensive operations of attempting removal of a wide margin around the uterus have proved unsatisfactory, with very high mortality and early recurrence.

6. That surgical measures for displacements are still *sub judice*, so far as any agreement as to any special method.

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# A NEW AND IMPROVED METHOD OF CLOSING VESICOVAGINAL FISTULÆ[1]

## With a Report of Two Cases

By A. LAPTHORN SMITH, M. D., Montreal
Surgeon-in-Chief of the Samaritan Hospital for Women

According to Emmet, vesicovaginal fistulæ had become much more rare, while lacerations of the cervix and perineum had become much more frequent, from the same cause; namely, the earlier resort to the forceps. In his younger days, he said, especially in the outlying districts, the forceps were seldom resorted to until the child's head had been impacted in the pelvis for one or several days, causing necrosis and fistula at the point where the head pinched the bladder against the pubic bone. As the number of skilled obstetricians increased with the improvement in medical education, this was rarely allowed to happen. And during the latest years there were so many physicians able and willing to use the forceps, that many patients and physicians declined to wait until nature had dilated the cervix and perineum, but resorted to the forceps in order to shorten the period of labor, with the result that the cervix and perineum were much more frequently torn. No one will deny the truth of these remarks, which, moreover, are borne out by the experience of every operating gynecologist. While the writer sees a case of lacerated cervix or perineum for nearly every day in the year, he meets with a case of vesical fistula not oftener than once in four or five years. In view of the rarity of the accident and the importance of obtaining a good result at the first attempt, the two following cases will be of interest. The method which was employed was first published by the writer in February, 1902, although the question of priority is of very little importance.

Case 1. Mrs. H. E., to whom the writer was called by Dr. Virolle, came under his care on the 4th of June, 1901. He was informed by her physician that she had had a very severe confinement six weeks before, the child weighing fourteen pounds, and having such a large head, that, after waiting forty-eight hours, he had been obliged to have recourse to instruments, although she had had four children normally before. After her delivery he found that she had a large vesicovaginal fistula, but he wisely waited until she had quite recovered and gained a little strength before calling for a consultation.

On examination, there was found a tear of the bladder vagina and cervix uteri, extending from immediately back of the sphincter vesicæ on the patient's right, transversely downward and backward through the os uteri on the patient's left, and measuring nearly two inches in length. The flow of urine over the raw surface had incrusted it with phosphates and somewhat thickened it. It looked as though the tear was due to the left blade of the forceps having caught the bladder and cervix under the arch of the pubis and cut it there, although it may have been caused by pressure.

With the old method as described by Marion Sims and Emmet, this would have been quite a formidable fistula to close, and the chances of failure would have been considerable; but by following the method which will now be described, and which the writer had already employed with good success, there was not only not the slightest difficulty in closing it, but the result was most satisfactory, not a drop of urine coming through afterwards.

### Operation

1. After careful disinfection of the vagina, the latter was incised across in front of the cervix, and the bladder pushed off the uterus in the same way as in the first step in vaginal hysterec-

[1] Read before the American Gynecological Society, Hot Springs, Virginia, May 22, 1906.

tomy, only it was not quite so easy, on account of the tear in the bladder having become joined to the tear in the uterus, and the tissues being thickened. The laceration in the cervix, which extended up to the internal os, was denuded and closed by Emmet's method with chromicized catgut.

2. The vagina was divided in the middle line, and was separated easily from the bladder with the finger everywhere, except where the two torn edges had become united to the fistula. With the finger between the vagina and bladder, it was not very difficult to separate them by a few cuts with the scissors from one end of the fistula to the other. As this cut gave a raw edge, there was no necessity of cutting away a single particle of either bladder or vagina.

3. The long tear in the bladder was now caught with a catgut stitch at either end, only taking in the muscular wall; and the assistant holding them on the stretch, it was only the work of a minute or two to bring the muscular wall together with an over-and-over fine chromicized catgut suture going back fully an eighth of an inch on each side, but taking great care never once to penetrate the cavity of the bladder or even to touch the mucous membrane. When this was finished there was a strong ridge on the site of the tear nearly a quarter of an inch wide, which was tested with sterilized milk injected into the bladder by a fountain four feet high, giving quite a pressure, without a single drop coming through.

4. Just as the workman who is shingling a roof takes care not to allow the joint of one layer to come opposite the joint in the second layer, so care was taken not to allow the line of sutures of the vagina to come opposite the line of sutures in the bladder. This was avoided in the following manner: The slit in the vagina was closed with interrupted silkworm gut passed through one side of the vagina, then through the muscular wall of the bladder, but half an inch to the right of the tear in the latter, and then through the other side of the vagina, thus displacing the bladder half an inch to the patient's left, so that the line of suture in the two membranes was no longer in the same place that the line of the tear had been. By this means the line of suture in the bladder was backed up or strengthened in front by half an inch of solid vagina instead of a line of sutures, and should any pressure accidentally be brought to bear upon the sutures in the bladder, it would have to overcome a valve instead of a hole, so that the harder it pressed, the tighter would the valve close. It was fortunate that this was so, for the *catheter à demeure* which was left in the bladder became clogged by a clot of blood, and some eight or nine ounces had accumulated in the bladder, before Dr. Virolle's attention was called to the fact that no urine was coming away. He immediately removed and cleansed the catheter and reintroduced it, after which there was no further difficulty. The catheter was left in for five days longer, after which the patient passed her water naturally four or five times a day, and has had no trouble since. I saw her only once after her operation, when I went with her doctor on the tenth day to remove the vaginal stitches, after which she went about her household duties, as well as ever.

CASE 2. The second case which the writer wishes to report was that of a Mrs. V., referred to him by Dr. Sylvester, with the following history. She was 24 years of age; had begun to menstruate at 11; married at 18½; mother of two children, the last one a year ago; no miscarriages; first labor, child only two and a half pounds, and very easy labor; second child weighed fifteen pounds, and labor was very difficult. As the head made no advance after twelve hours of severe pain, Dr. Sylvester applied forceps, immediately after which she began to have incontinence of urine. For the sake of the child he waited until the latter was weaned before sending her for operation. On examination she was found to have a small fistula halfway between the cervix and the urethra, about the size of a lead-pencil. She was admitted to the Samaritan Hospital, and was operated on by the method described in case 1.

The *catheter à demeure* was used in case 2, and as the patient was in the hospital, it was possible to watch it more carefully than in case 1, which was done at home, and without a trained nurse being in charge of her. The catheter was removed and washed twice a day, as it took only two or three minutes to do this. The operation was exceedingly easy, taking only about ten minutes for its performance, while the result was all that could be desired. She left the hospital perfectly cured at the end of ten days, and has had no trouble whatever since.

The writer desires to call particular attention to three points: 1. By the method above described, no stitches are allowed to enter the

bladder, thus avoiding the danger of forming the nucleus for a calculus; a rather frequent accident by the old method. The bladder mucous membrane is brought together by the drawing together of the muscular layer right beneath it. 2. Instead of depending upon the union of a narrow edge about the thirty-second of an inch thick, we obtained a thick ridge fully an eighth of an inch thick in the bladder alone, to say nothing of the thickness of the vagina in front of it. 3. The great importance of leaving in the *catheter à demeure*, which should be used in every case in which anything has been done to the bladder-wall, as it removes all tension, and places the bladder at complete rest as long as it remains in.

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## ANÆSTHESIA IN THE FIRST STAGE OF LABOR[1]

By FRANKLIN S. NEWELL, Boston, Massachusetts
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THERE is probably no branch of medical practice in which tradition plays so prominent a part at the present time as in obstetrics. The fact that in normal women child-bearing is a natural process, and that departures from the normal should be rare exceptions, has given rise to a general impression that interference with the course of labor is, to say the least, inadvisable until definite indications arise.

The teaching of obstetrics at the present time, if one can believe the modern text-books on the subject, deals only with the care of the natural woman in pregnancy and labor, and entirely overlooks the evident fact that the highly civilized woman of our larger cities is an abnormal product, and is no longer the natural woman that is taken as the type on which all teaching is based. It follows naturally, therefore, that many conclusions which are based on the assumption that the conditions of practice are not subject to change, and that we are dealing with the same class of patients as those on whom the original observations were made, must be false when applied to the over-civilized women of our modern society. The life which is led by the average society woman of to-day, from the time her education is begun, instead of preparing her for the burdens of her mature life, distinctly tends to unfit her nervously for the strain which is attendant on pregnancy and labor. The natural result follows, that, with the increased nervous instability shown by the increase in nervous breakdown among young girls and women of this class, the power of standing pain has become diminished, and the reaction to pain of even moderate degree distinctly increased. The result of this unnatural sensitiveness to physical strain is, that we find an increasing number of women who are nervously broken down for a longer or shorter time after their first pregnancy, or who, if they come through the strain without a definite breakdown, nevertheless say that the suffering has been such that they are unwilling to undergo the ordeal a second time.

It seems to me that these results follow naturally on the general teaching that labor is a physiological process, and must not be interfered with until symptoms arise which render relief imperative, and that these results will be found in a steadily increasing ratio until the profession can be made to understand that the over-civilized modern woman represents a new type, and that the practice of obstetrics must be changed in order to meet the new conditions which have arisen.

We must recognize that complications during and following labor among society women are constantly on the increase, and that to avoid these complications, the causes must be removed, as far as possible. The teaching that the pain of labor must be borne until nature fails to give relief is responsible for a large proportion of the bad results. This teaching

[1] Read before the American Gynecological Society, at Hot Springs, Virginia, May 24, 1906.

has been perpetuated, in my opinion, for two reasons. In the first place, labor being considered a simple normal process, the greater proportion of confinement cases are cared for by the general practitioner, who has been taught to believe that departures from the normal are so rare that he need take thought of them only after they arise, and who seldom recognizes abnormalities until it is too late to prevent trouble, and who, therefore, considers it unnecessary to oversee properly the course of labor, since he has been told that nature is all-sufficient, and that when nature fails it is not his fault, but that the consultant will take the blame for whatever bad results may follow his neglect.

This condition emphasizes the claim, which has been repeatedly made of late years, that the general practitioner should not attempt to handle obstetric cases when a specialist can be employed, because he is usually unable to foresee and forestall complications.

The second reason against the early use of anæsthesia seems to be that if the patient's sufferings are relieved in the early part of labor, she will refuse to go through the remainder of her labor without help, and the use of anæsthetics must be continued until delivery is accomplished. This is hardly a serious objection, however, since it involves inconvenience and trouble to the attendant only, who must give the patient the care and attention her case demands, instead of relegating the case to her nurse, for whose work and watchfulness he collects the fee.

For some time I have firmly believed that the suffering involved in labor deserves relief, and I have made it a rule to tell each patient at the beginning of labor that when the pain reaches such a point that she desires relief, she can have ether to the degree of dulling sensibility, no matter what stage of labor has been reached.

There are certain theoretical objections urged against the prolonged use of ether: 1. That the tendency to post-partum hemorrhage is increased; 2. That labor will be prolonged, owing to the stopping of the pain; and 3. That infant mortality will be increased.

In a series of fifty primiparous labors, in which I have used ether during the first stage from the time when the patient asked for it, the results have been satisfactory, both to me and to the patient. In these cases there has been apparently no increased tendency toward hemorrhage, and I believe that hemorrhage is almost always due to improper conduct of the third stage of labor and to a lack of care in guarding the uterus afterwards, and that the tendency to hemorrhage is very slightly increased, if at all, by the prolonged use of ether. In regard to the danger of prolonging labor by stopping the pains, my experience has been that the use of ether, to the obstetrical degree, during the first stage of labor exerts no effect on the rhythm and regularity of the contractions, and that, far from delaying dilatation of the cervix, dilatation proceeds distinctly more rapidly when the sense of pain is somewhat dulled. It seems probable that spasm of the cervical muscle is developed by the pain involved in its dilatation, and the early relief of this pain, in my opinion relaxes this spasm, and distinctly hastens dilatation. The effect of prolonged administration of ether on the children has been noticeable in a considerable proportion of the cases, and many children are fairly deeply etherized and require careful resuscitation. I have yet to see, however, any serious effect on the child from this anæsthetization, and it seems to be distinctly less marked than is the rule in children delivered by Cæsarean section, where a full dose of ether is used for a short time only before delivery.

Aside from the definite advantage, already mentioned, that ether used in this way confers by shortening labor, another, and to my mind one of the greatest importance to the patient, is the fact that although the severe pains of labor are felt and complained of at the time, the general effect of the ether is to cloud the recollection to such a degree that the patient does not look forward to a second labor with fear on account of the suffering involved in her first labor.

That ether used in this way during contractions gives marked relief is easily proved by the patients' statements, when, in a subsequent labor, pride has impelled them to go without relief until the second stage is well under way.

I have seen no bad results that can, in my opinion, be attributed to the prolonged use of ether, although there are certain points that may call forth criticism. In the first place, about seventy-five per cent of the labors have been terminated by operation, usually low forceps, early in the second stage. This has not been due to the effect of the ether on labor pains, however, but to my own personal belief that the nervous and physical exhaustion entailed by a more or less severe second stage will do more permanent harm than a carefully performed operative delivery; and since I have adopted this policy I have had very few unfavorable complications during the convalescence, and the patients have recovered their normal nervous tone much more rapidly than when operation has been resorted to only after nature has failed.

At present I believe that the great majority of patients would react much more favorably after a short labor terminated by operation than after a prolonged natural labor.

In two cases I have seen results which might be attributed to this policy of early operation following the use of ether, were it not for the fact that I have had similar results in cases where neither ether nor operative delivery was employed. In these two cases delivery was followed by an acute collapse in the absence of hemorrhage, which lasted for several hours, but was followed finally by reaction and recovery. I am inclined to attribute this collapse to acute dilatation of the heart, and I believe that it might have been avoided in both instances by an earlier operation, thus sparing the patients from the strain of labor to a greater degree. I have seen the same results follow a short normal, multiparous labor, in which ether was given only as the head passed over the perineum, and I believe that the strain of labor on a flabby heart is the important factor in the case, and that early anæsthetization and operation is a safeguard rather than a danger. My own feeling is, that the pain and strain of labor is a serious burden to the average woman to-day, and that every means should be employed which can lessen the existent dangers without adding new ones, and I believe that the use of an anæsthetic from the time when labor becomes severe tends to relieve the pain and strain to a considerable degree.

Although the use of ether has proved satisfactory in my hands, the reports of scopolamine-morphine anæsthesia in general surgery seem to indicate that there may be a future for this method of anæsthetization in obstetrics, while the simplicity of its administration, combined with the absence of even the slight discomfort which is attendant on the use of ether, would render it an ideal method for use in labor if its action could be proved both certain and safe. With this object in view I have employed it in forty-one cases, bearing constantly in mind the fact that its abuse, or rather overuse, has been responsible for a considerable number of deaths, when it has been employed as a general surgical anæsthesia. The ideal action of this method can be best exemplified by the following case.

Mrs. A., 23, primipara. Labor began at 8 P. M., August 2d. Pains infrequent and slight till 10:30 P. M., when they became strong and regular, recurring every five minutes, lasting three quarters of a minute. Patient seen first at midnight. Very strong pains, lasting a minute, recurring once in four minutes. Examination showed a rather rigid cervix, dilated an inch, head presenting, position left-occipito anterior. One subcutaneous injection of 1-200 scopolamine and $\frac{1}{6}$ of morphine was given. Patient gradually became drowsy, and complained less of the pains. Within half an hour the patient began to sleep between the pains and during the less severe pains, waking only at intervals of from ten to fifteen minutes, when an unusually severe pain occurred, and dropping off to sleep again when the pain had ceased. At the end of about five hours the effects of the drugs seemed to have disappeared. Examination showed a fully dilated cervix, the head being on the perineum. Good pains at short intervals for the next half-hour resulted in no apparent progress, and the patient was etherized and delivered by forceps. The third stage of labor was normal, the placenta being expressed after six or seven good contractions. There was no abnormal bleeding, and the patient's pulse was good and regular throughout the labor. The only noticeable abnormality about the labor was that the uterus showed a marked tendency toward relaxation after the conclusion of the third stage, and it was at least an hour before proper contraction occurred. The total length of labor, including the operation, was but ten hours, or distinctly shorter than the average primiparous labor, and there can be no doubt about the relief from pain afforded by the anæsthetic.

The advantages which have been claimed for this method of anæsthetization are: 1. Labor

is rendered almost comfortable in the majority of cases by the relief from pain afforded by the use of the drugs; and 2. Labor is distinctly shortened by the effect of the scopolamine in relaxing the cervical muscle, and thus cutting short the first stage.

The disadvantages would seem, theoretically at least, to be a lessening of the contractile force of the uterus, thus rendering the second stage of labor inefficient, owing to the reduced power of the uterine muscle; an increased danger of relaxation of the uterus and consequent hemorrhage following the third stage, dependent on the same cause; and the danger attendant on the use of a cardiac depressant like scopolamine, particularly when combined with morphine, in a patient with a weak heart.

In the series of forty-one cases on which this paper is based, the ordinary dosage was 1-200 of a grain of scopolamine combined with $\frac{1}{6}$ of a grain of morphine given hypodermically. In twenty-seven cases, one dose only was given, and in fourteen cases the dose was repeated at least once. In two cases, scopolamine alone was used, in order to give some idea of its efficiency when not combined with morphine. In one patient, morphine was tried without the scopolamine.

In the twenty-seven cases that received a single dose, there was marked relief of symptoms in eighteen cases, while in nine cases no effect was noted and the character of the labor was apparently not modified. In the patients who reacted favorably to the drug, the effect varied with the susceptibility of the patient. In a few cases the patient fell into a sound sleep, lasting from one to three hours, although the uterus could be felt contracting regularly, and the relief from pain lasted for some time after the patient awakened, while in others the patient slept only in the intervals between pains. A few patients did not sleep, and stated that although they could still feel the contractions, they suffered no pain. Of the fourteen patients who received more than one dose, eleven experienced marked relief, one patient sleeping seven hours out of ten, from the time of the first dose until delivery was accomplished. It is evident, therefore, that the susceptibility of patients to the effects of the drugs varies markedly, and that in a considerable proportion of cases the dose must be repeated before a marked effect can be expected.

The second stage of labor was unsatisfactory in seven cases, six low forceps operations and one breech extraction being necessary. Five operative deliveries were necessary in patients who had received only one dose of scopolamine, and since four of these patients had not reacted to the drug symptomatically, it is at least doubtful whether the operative list was at all increased by its paralyzing effect on the uterus. The unpleasant symptoms which must be attributed to the drugs were noted as follows.

In four cases, three of whom showed no other signs of reacting to the treatment, there was moderate post-partum hemorrhage, though in no case to a dangerous degree. In two other cases the action of the uterus after the completion of the third stage was distinctly unsatisfactory, a marked tendency to relaxation being noted, although no hemorrhage occurred. Three patients vomited throughout labor following a single dose. This effect was probably due to undue susceptibility to the morphine, rather than to the scopolamine. One patient ran a poor pulse for some hours after a repetition of the dose, the rate at one time reaching 150, and the patient's condition seemed distinctly alarming. One patient complained of dizziness after a single dose, although her pulse was unchanged. Thirty patients experienced no unfavorable symptoms. The length of labor in the twenty-eight patients who experienced relief from pain was distinctly shorter than the average primiparous labor, averaging 12½ hours, while in the patients who experienced no relief, the labor averaged 30 hours. Whether this effect was due or not to the action of the scopolamine, it is impossible to determine, but it is at least suggestive, and it seems fair to assume that in the patients who react favorably to the drug, the first stage of labor is apt to be distinctly shortened. In the two patients who were given scopolamine without morphine, there was no relief from the pain, although in one case the dilatation of the cervix seemed to proceed more rapidly after the drug was given, than before. The patient who was given morphine without scopolamine had marked relief from pain, sleeping

between pains for about 3½ hours, following a dose of one quarter of a grain, and finding the pains distinctly relieved. Of course no effect was to be expected on the dilatation of the cervix.

CONCLUSION

In comparing the results obtained by the two methods, I believe that the action of ether during the first stage is more certain, and less liable to be followed by uncomfortable after-effects, than the use of scopolamine and morphine, but its administration involves more trouble to the attendant.

Definite results are to be expected from the use of scopolamine-morphine in combination in the majority of patients, and patients who are not susceptible to its effects do not seem to show any serious after-effects, while the frequency of operative delivery does not seem to be increased by its use.

The after-effects are slight when the dose is carefully limited, though the action of the uterus after labor is completed must be carefully observed, as relaxation, with the consequent hemorrhage, is a distinct danger. Scopolamine alone seems to have no effect in controlling the pain of labor, while morphine alone may control the pain satisfactorily, but has no effect in hastening dilatation.

Although there have been no serious results among the cases on which this paper is based, the one patient whose heart reacted badly serves as a warning against over-free or indiscriminate employment of this method of anæsthesia, and only a wider experience can prove whether the dangers are real or imaginary.

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# ENTEROPTOSIS [1]

## With Special Reference to Body Form, the Mechanical Conditions Governing the Position of the Abdominal Organs, and the Use of the X-ray in Demonstrating Stomach and Intestines

By RICHARD R. SMITH, M. D., Grand Rapids, Michigan

THE literature on the subject of enteroptosis has grown to large proportions. If we add to it all that has been written in regard to movable kidney, gastroptosis, and displacements of the pelvic organs, this is multiplied several times.

Since 1885, when Glénard first pointed out the general character of the ptosis, our conceptions have gradually broadened.

Enteroptosis is no longer to be regarded simply as a ptosis of one or more of the abdominal organs, but as a distinct habitus, characterized — 1. By a flabbiness or hypotonus of the body tissues; 2. By a lack of vital energy; and 3. By a more or less pronounced backwardness in development.

If we examine such patients, we note a long, narrow, shallow, and usually more or less collapsed thorax, flaccid abdominal walls, usually prominent abdomen, changes in the curves of the spine, a general relaxation and flabbiness of the muscular connective tissue structures, and, as a rule, abnormal lightness of weight. There is a ptosis of the abdominal viscera, and perhaps a displacement of the pelvic organs. Combined with these objective symptoms we find a list of subjective phenomena, the principal of which we may enumerate: General weakness, an inability to carry on her work without exhaustion, nervousness, oftentimes melancholy, constipation, and disturbances of digestion and other functions, such as those of menstruation and urination. Patients commonly have pain in the back, in one or both sides, and in lower abdomen, bearing-down pain, leucorrhœa.

It is not my purpose to discuss the subject exhaustively, but to direct your attention simply to a few phases of this disease: the form of the body, the mechanical conditions govern-

[1] Read before the American Gynecological Society, Hot Springs, Virginia, May 24, 1906.

ing the normal and prolapsed abdominal organs, and the condition of the stomach.

*Body Form.* When we study the normal woman, we find a thorax relatively somewhat longer than a man's, but of good depth, and fairly broad at the waist. The epigastric angle measures about ninety degrees, or perhaps slightly less. In a well-built thorax the lower ribs run but slightly downward from the horizontal. The spinal column in its upper portion is quite straight, the arms set well back; beginning at the lower lumbar region is a marked lordosis that terminates at the buttocks, which protrude well beyond the general axis of the body. The thorax, as a whole, is placed forward of this general axis; the abdominal walls are flat, or protrude but very slightly; the limbs are straight; the foot well arched; the muscles firm and covered with enough adipose to round out the angles.

I show you here several pictures of what one may regard as normal women. Note in this picture (Fig. 1) the well-developed chest, abdomen, and limbs. The waist is broad; the thorax of good depth; the whole figure bespeaks health and vigor. This second picture (Fig. 2) shows much the same thing. The thorax is well built, the abdomen flat, the limbs well rounded. The third picture (Fig. 3) shows the back of a well-developed, normal woman. Note here the marked lordosis of the spine — somewhat exaggerated, perhaps, by the position in which she stands — also the prominent buttocks, the flat abdomen, the well-developed chest, the well-muscled body and limbs.

Let us, however, regard an exaggerated case of enteroptosis. The thorax is long, narrow, flat, and sunken; the so-called paralytic thorax. The lower ribs, instead of running nearly horizontal, slant sharply downward; the neck is often very long; the intercostal spaces are increased in the upper part of the thorax, but not below; the tenth rib is often floating; the waist, or middle zone of the trunk, is slightly increased in length. If the patient is standing, the abdomen is prominent, especially in its lower portion. The epigastrium is flattened. The woman often has round shoulders, and instead of a well-marked lordosis in the lumbar region, the back is nearly straight and the buttocks flattened. This last expresses a tilting of the pelvis forward, so that its axis is much more vertical than usual. The muscles of the body are generally slender and flabby. She has little adipose tissue, the arch of the foot is often flattened, although the patient is light of weight.

If we inspect the abdomen of a woman with enteroptosis (Fig 4), we are at once struck with the length of the waist and its smallness. The epigastric angle is sharp, and there is apt to be a decided flatness or slight concaveness of the epigastrium. With such a picture before us, we suspect at once that the right kidney may be palpable; that, under dilatation with gas, the greater curvature may be found at or below the umbilicus; and that there will be other evidences of visceral ptosis.

This picture (Fig 4) is that of a married woman, 33 years of age, who has never borne children. The form is typical of enteroptosis. The width at the waist is 17.5 cm. (7 inches), and the depth 17 cm. ($6\frac{2}{3}$ inches); the epigastric angle is long and sharp, the index 94.5.[1] Her color and nutrition, however, are fairly good.

Becher and Lenhoff have reduced this observation to definite figures. They take the jugulopubic distance and divide it by the circumference of the body at the waist and multiply the result by 100. This index gives the clue to the comparative size of the upper abdomen. They found a palpable kidney in practically all with an index of over 77, and none in patients with less than that.

Harris states that the cause of floating kidney lies in a particular body form. The chief characteristics of the body form are marked contractions of the lower end of the middle zone of the body cavity. He first divided the jugulosymphysis distance by the circumference at the tenth rib, practically the same as the method of Becher and Lenhoff. Finding

[1] It might be well here to state that tight clothing, either corsets or waist-bands, cannot cause such a body form as we here describe. The influence of the corset has been made the subject of much discussion, and views have varied widely. We find those who ascribe to its use the most deleterious effects, and also, at the other extreme, those who believe that it is a help, rather than a detriment, to the woman who wears it. Becher and Lenhoff examined twenty-four women of Samoa, and found this same body form and palpable kidneys in a number of them. These women had never worn corsets or waist-bands, nor had their ancestors. A number of women, whom I have examined, with the most markedly contracted waists have either never worn corsets at all, or if so, only occasionally. We cannot conclude from this, however, that a woman with enteroptosis may not be injured by the wearing of a tight corset or waist-band.

Fig. 1.

Fig. 2.

Fig. 3.

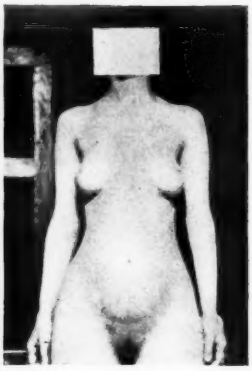

Fig. 4.

this method open to certain errors, he then took the lateral diameter of the body (standing) at the level of the end of the sternum, and again this same diameter at the lower border of the tenth rib, then divided the latter by the former and multiplied by 100. This gave him an index which he claims to be reliable. All cases showing an index of over 81.8 are negative, and all under it are positive. Besides this, he made other careful measurements of the middle portion of the trunk, with the idea of reducing to figures the body capacity there.

I have taken careful measurements of 56 women in reference to enteroptosis, measuring the depth of the chest at the end of the sternum, the diameter of the waist, and obtaining the index of Becher and Lenhoff. I have noted, also, the slant of the ribs, the epigastric angle, the form of the thorax, abdomen, and back. Although these observations are too few in number to warrant elaborate deductions, a number of facts stand out clearly. First, that the long, narrow, shallow thorax, small waist, and protuberant abdomen are accompanied by visceral ptosis, and that the woman with the normal thorax, large waist, and flat abdomen has her abdominal organs in place. Incidentally, I think, too, that one may safely say that the sharpness of the epigastric angle usually corresponds to the narrowness of the waist and the downward deflection of the ribs to the flatness of the thorax. We may note the relative collapse of the thorax by the observation of these two signs.

From a number of pictures that I have taken I have selected several for illustration. In Fig. 5 we see the form of a woman 35 years of age. She was frail in infancy, but passed a fairly vigorous childhood and girlhood. She had one child fourteen years ago, and was fairly well until she had an ischiorectal abscess ten years ago. Since that time she has had a number of such abscesses, and six months ago a pelvic abscess, which discharged through the vagina and has kept her in bed since. A rather frail body o begin with, you see, though her sickness during the last year has had much to do, evidently, with her present condition. This picture was taken two weeks after opening and draining the pelvis from below. Note here the very flat back, the prominent, flabby abdomen, the decided slant to the ribs. The shallowness of the chest, on the other hand, is not particularly marked. The depth is 17 cm.; the width at the waist 24 cm. (9½ inches). Her index (Becher and Lenhoff) is 70. Examination under gas shows the lower border of the stomach about two inches below the umbilicus; the uterus is retroverted.

Fig. 6. A nullipara, aged 24, who in early childhood was very frail. After menstruation began, her health improved, and she states that she had good health until she was 18, when she was infected with gonorrhœa. Since this time her health has suffered from frequent attacks of pelvic inflammation. We did a hysterectomy for double pyosalpinx. Notice the straight back, rather prominent

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

abdomen, very decided slant to the ribs, and the shallowness of the thorax — only 15 cm. (6 inches). Her index is 83. This woman's appetite and digestion were good, in spite of the fact that the greater curvature of the stomach was found about two inches below the umbilicus.

Fig. 7. An unmarried woman, 33 years of age, who since earliest infancy had never been strong. However, she claims to have been in good health until fifteen years ago (aged 18), when she went to work in a factory. She soon broke down under this, and has been an invalid ever since. This is the most pronounced and typical case of the congenital type that I have met this year. She is undersized (4 ft. 10 in. = 147½ cm.), weight 74 pounds; she is pale, slightly jaundiced, and her face expresses marked melancholy and lassitude. Her movements are all slow, and she responds languidly to questioning, and it is only possible to interest her in matters concerning herself. Note here the frail, slender figure, the round shoulders, the long neck, the straight back, in which the normal lordosis is almost eradicated. The ribs slant very sharply downward, the thorax measures 13 cm. (5¼ in.) only in depth, and but 20 cm. (8 in.) in breadth. Her index is 97. It is possible to encircle the waist with the hands. The abdomen is but slightly prominent, the epigastrium flat or slightly concave. She has a small, hyperplastic, anteflexed, and retrodisplaced uterus. The right kidney is palpable; the lower border of the stomach, under dilatation, is found three inches (7½ cm.) below the umbilicus.

Fig. 8. In this picture we see an example of the acquired type, so called. A farmer's wife, 33 years of age. During childhood was perhaps more robust and vigorous than the average child. She married young; has had four children, of whom she has had all the care. Besides this, she has done all the housework without help, has milked cows, carried in water and wood, and in the rush season has gone into the fields to pitch hay with the men. There has been a gradual loss of health; she has become exceedingly nervous; has hysterical attacks, trembling and rigidity. She complains of pain in both groins, across the abdomen, in the right side, bearing-down pain, general abdominal soreness, above the hips and around the waist. She feels constantly tired, has no appetite, and complains of abdominal

Fig. 9.

Fig. 10.

distention, regurgitation, and a heavy feeling in the stomach. She noticed that she has been getting round-shouldered for several years back. Note here the decided rounding of the back, the prominent abdomen, the loss of proper lordosis to the spine. The thorax, outlet relaxed. The greater curvature of the stomach under dilatation lies one half-inch above the umbilicus.

Fig. 9. In this picture we see a back which, viewed from the side, is almost perfectly straight. The lordosis is completely eradicated.

Fig. 11. Taken twenty minutes after meal. X-ray picture taken from woman shown in Fig. 6.

on the other hand, is 17.5 cm. (7 in.) in depth and 22 cm. ($8\frac{3}{3}$ in.) in breadth. There is considerable slant to the ribs. Her index is 75. Note also the strong, well-developed arms, and, on the whole, the well-muscled body. The right kidney is easily palpable, the uterus retroverted, the pelvic connective tissue and This woman, in addition to an enteroptosis of a congenital type, has had a fibroid uterus complicated with pus-tubes.

The form of the back in this disease has, I believe, been first pointed out by Mathes. It bespeaks a giving way to pain or weakness. Such backs are very common in enteroptosis,

and are, in a way, rather proportionate to these two symptoms. They improve as the woman regains strength and health. It is not uncommon to find a well-formed back in such patients. This young woman (Fig. 10) has a rather slight degree of the trouble. The thorax measures but 15.5 cm. in depth; her index is 80; the right kidney is palpable. She is, as you see, well nourished, and the back is normal.

Fig. 12. Taken one hour after eating, patient standing. X-ray picture taken from woman shown in Fig. 6.

When we come to study the mechanical conditions prevailing in enteroptosis, we at once encounter a rather complex and difficult problem. It is this very complexity that has led to the expression of so many different opinions in the matter. I shall not attempt here to review them.

Let us first regard the conditions normally present. We must first rid our minds of the idea that the abdominal viscera hang upon or are supported — to any appreciable extent, at least — by their ligaments or mesenteries. These act simply as guy-ropes, preventing

excursions beyond certain limits. The abdomen is a hermetically sealed cavity. Owing to the fact that the visceral mass, as a whole, is capable of great change in form and position, many of the same laws govern it that would govern so much water in a like cavity.

The upper part of the abdominal cavity is surrounded by the rigid thorax, about one half of which it occupies. In front are the firm abdominal walls. Above is the diaphragm. Within the pleural cavity there exists a so-called negative pressure (i. e., atmospheric pressure minus the elastic pull of the lungs). This negative pressure tends constantly to draw the diaphragm upward. The weight of the abdominal viscera draws it downward. The balance of the weight is borne by the pelvis and anterior abdominal wall. The rigid upper abdomen must ever remain filled with the viscera; they cannot drop downward without producing a vacuum, which, under existent forces, is impossible.

Fig. 13. Taken six and a half hours after eating. X-ray picture taken from woman shown in Fig. 6.

Under normal conditions the upper abdomen contains the liver, kidneys, stomach, spleen, pancreas, and part of the intestines. Their weight pulls downward on the diaphragm, inward on the rigid lateral walls. It is reasonable to think that when these walls are less firm than they should be, they will collapse. In enteroptosis we have just such a

lack of firmness. As a consequence, the lower thorax draws inward, the diaphragm downward, — as can be shown by the X-ray, — and the epigastrium becomes flat or concave. If the abdominal walls below are flaccid, they bulge, and no longer bear their share of the weight; this tends further to exaggerate these changes. The matter of weight may explain, also, the changes in the rest of the thorax; the slant of the ribs downward, the widening of the intercostal spaces, the prolapse of the anterior wall, with consequent lessening of the anteroposterior diameter.

Fig. 14. Taken twenty-two hours after meal. X-ray picture taken from woman shown in Fig. 6.

We have been speaking of the abdominal organs as a whole; let us regard them individually. First, the liver. Its position is unique. Lying directly in contact with the diaphragm, it cannot leave it without producing a vacuum, since intestines or omentum cannot slip in between. It can glide forward or backward, but only to the limit of its ligaments, which do not allow much excursion. Held so closely to the diaphragm, it takes but little part in the ptosis. In a few cases, however, it drops far enough forward on its ligaments to become palpable beneath the border of the ribs. The kidneys are held in no such way. It is perfectly possible for intestines or soft parts to

slip between them and the overlying parts, and they readily take part in the ptosis. The reason for the right kidney's being so much more susceptible to this than the left is not settled. All the theories until now advanced lack sufficient proof. The fact remains that the left prolapses less often than and not so far as the right. The splenic flexure of the colon also tends to remain fairly well fixed. The intestines with their long attachments move downward and hang upon their mesenteries.

a glass of water, being used. This corresponds in a general way to the figures of other observers.

This method is open to considerable error. Not only may we occasionally mistake gas in the colon for the stomach, but the gas from the latter, passing quickly on into the small intestine, may give us a false reading. Again, it is difficult to obtain readings in the standing position, and those in the prone position do not always give the full extent of the error.

Fig. 15. Normal. Taken immediately after meal.

Let us now consider the stomach. On examining patients in reference to enteroptosis, observers have for a long time been impressed with the fact that a large percentage of them presented a decided ptosis of the stomach. On examining 100 patients in reference to this point, I found the greater curvature under dilatation to be as follows: 52 cases below, 22 at, and 26 above the umbilicus. Examinations were always made in the prone position, one half-dram of tartaric acid and one dram of bicarbonate of soda, each in half

Still, it may give, in a general way and roughly, the position of the lower border of the stomach. In this series of cases I have also outlined the upper border of tympany. With the knowledge which we possess of the position and shape of the stomach, it seemed to me that this latter finding was practically worthless. In nine cases, Dr. Hulst of Grand Rapids has taken for me a series of X-ray pictures in order to compare them with other findings. The method adopted was as follows: An ounce of bismuth was given in a pint of milk at noon,

on an empty stomach. As soon after this as possible — usually within an hour — two X-ray pictures were taken, as follows: The first in the prone position, the tube being placed twenty inches from the body, and as nearly opposite the umbilicus as possible. In order to mark the umbilicus — the landmark commonly used in discussing this question — a dime was placed over it and held with plaster, and one directly opposite, on the back. If, then, the ray from the tube at this distance produced superimposed shadows of the two coins, we knew that the structures lying in the neighborhood were subject to little or no distortion. The second picture was taken similarly, but in the standing position. In order to determine the motility of the stomach, another was taken six hours afterward. A normally functionating stomach should, of course, be empty at this time. At the end of about eighteen or twenty hours, a fourth picture was taken to outline the colon.

Fig. 16. Normal. Transverse colon taken twenty-seven hours after meal.

I wish here to show the plates obtained from one of my patients. (Fig. 11.) This is the young woman whose profile I showed you in Fig. 6. This first picture was taken twenty minutes after the bismuth meal, with the patient in the

prone position. The caudal pole of the stomach is found three inches below the umbilicus; the lesser one, one inch below. Note the fish-hook shape of the lower portion. You must bear in mind that the stomach extends from the diaphragm above, which can be seen here to its lower portion. The folds of the stomach above have retained some of the bismuth.

In this picture (taken immediately after the first), the lower border of the stomach is dimly, but still distinctly, outlined, and can be seen five inches below the umbilicus. (Fig. 12.) Here, also, we see traces of the bismuth in the stomach above.

When we come to examine stomachs with the X-ray we see that the gas method gives us no adequate conception of the shape. For instance, the lesser curvature, as ascertained by the gas method, came one inch (2½ cm.) below the ensiform. As a matter of fact, the lowest point of the *lesser* curvature in all of these cases lay quite near the lowest point of the *greater* — from ¾ inch (2 cm.) to 1½ inches (4 cm.) difference.

In examining these cases, we at once ask ourselves, What is the normal size and shape of the stomach? I believe that the recent views of Holzknecht are as near the truth as any we have obtained. He has examined a large number of stomachs with bismuth under the fluoroscope, and believes it much better than the use of pictures. He came at once upon stomachs in which the long axis was vertical, in which the difference between the caudal portion of the greater curvature — lying higher or lower over the navel — stood at a lower level than the pylorus. This lower portion formed a hook. On account of the frequency of this form, we have always regarded it as normal. There came, however, a much smaller percentage to observation, in which a much smaller stomach without this formation, but with the pylorus as the deepest portion, existed. He thought that this might be the normal stomach — until now rather vaguely called microgastria. The fact that the frequent vertical form in its width and elevation varied so much, while he found a constancy in this new form, and that the differences in the former formed a well-graded series of changes which ended in the second form, and that this second form should give the best result, — an engineer would build it so, — brought him to the conclusion that this really was the normal stomach.

I have here the plate of the stomach of a healthy young man, showing an approximately normal stomach. (Figs. 15 and 16.) Here we see the lower border lies well above the umbilicus and nearly on a level with the pylorus. The whole organ is small.

What takes place with the stomach in enteroptosis? Two points of the stomach remain fixed within comparatively small limits — the pylorus and cardia. It may be presumed that the stomach-walls take part in the general muscular relaxation of the other tissues of the body. Loaded with food, its walls give way, its cavity enlarges. The same factors that tend to displace the other organs of the upper abdomen in enteroptosis may also act here. This enlargement can take place in only one direction; namely, downward. Held at the cardia and pylorus, being unable to extend much laterally, the caudal portion of the greater curvature is gradually pushed downward. The stomach stretches lengthwise, and produces the shape which we have seen. Empty, these stomachs do not contract, as does the intestine, but the walls fold in, as has been shown by Holzknecht, and when the stomach again receives food, they rather unfold than dilate.

In this series of pictures there was shown in all but one a considerable difference between the lower borders taken with the patient prone and standing. This variation measured from ¾ inch (2 cm.) to 2½ inches (6½ cm.); usually the variation was 1½ or 2 inches.

This fourth picture is one from the young woman mentioned, taken six and a half hours after the meal. The stomach has risen about one inch (2½ cm.), and still contains bismuth. The sphincter of the antrum is here well shown. There appears now the ascending colon, much prolapsed. Lastly comes a picture taken twenty-two hours after the meal, showing the colon still filled with bismuth, some gas above it. The splenic flexure is here shown, distended with gas and containing bismuth. The transverse colon, as you see, was much depressed. Here, below, the

entrance to the rectum is indicated by a small amount of bismuth.

As will be shown by these pictures, the large intestine takes part very decidedly in the visceral ptosis. When we compare a considerable number of cases, certain facts stand out. First, that the hepatic flexure is lower than the splenic, and is more apt to be displaced and in greater degree, although it is not rare to find the splenic flexure, as in this case, somewhat prolapsed. It remains often fairly well fixed. The transverse colon sags considerably. It is, of course, always found below the lower border of the stomach. For comparison I present here (Plate 6) the picture of the colon of the young man whose stomach I have just shown you as being normal. It may be regarded as normal. One sees here the cæcum distended with bismuth; the transverse colon looped gently and quite easily across the abdomen; the splenic flexure higher than the hepatic, and one can trace here the sigmoid and rectum. The course of the intestine, you see, differs somewhat from that usually given in our text-books.

An examination of the stomach contents of patients suffering from enteroptosis does not show startling abnormalities. Different observers come to different conclusions; some stating that hyperacidity was the rule, others, that there was a lack of hydrochloric acid. It is the variation in these findings in different cases that probably led to these results. In twelve patients with enteroptosis, suffering from stomach symptoms, there were six cases of hyperacidity, three were normal, and three showed a hypoacidity. The peptic digestion was good in all, with the exception of three, where it was slow. Two of the cases showed considerable mucus; the others, no more than the usual amount. Three or more examinations were made of each patient. It was noticeable that the findings varied considerably at different examinations of the same patient. Whereas the number of these patients is too small to draw any definite conclusions, corresponding as they do with the findings of others, it would be safe to say that the chemical changes are not constant.

Finding stomachs so misshapen and displaced, it has been the most natural thing to ascribe the stomach symptoms from which so many patients with enteroptosis suffer to the mechanical conditions there present, and a number of theories have been expounded — kinking of the pylorus, weakened musculature through dilatation, difficulty in raising the contents up over the pylorus. None of these have seemed quite sufficient. Certainly, a considerable number of patients with markedly elongated stomachs are free from any stomach symptoms. Nature undoubtedly makes an effort to compensate for the unnatural condition of things, and, fortunately for all of us, she is often able to handle satisfactorily the food which we take. Just in which direction incompensation takes place, or where the normal function is broken, or how, I do not think we are prepared to say. The facts until now obtained do not warrant our being too positive.

In the patients whom I have examined in reference to this point, neither with gas nor by the Röntgen ray method did there seem to be any particular association between the amount of the stomach displacement and the severity of the stomach symptoms. The patient represented in Fig. 8, for instance, had a greal deal of stomach disturbance, although anatomically it was one of the best that we examined. The woman represented in Fig. 6 had absolutely no stomach symptoms, although with the ray the lower border of the stomach was shown 2 inches (5 cm.) below the umbilicus. Of seven from whom plates were made six hours after a bismuth meal, five had stomach symptoms, and their stomachs all contained bismuth; the two without symptoms, however, had stomachs free of bismuth at that time. This would seem to indicate that the symptoms were associated in some way with a lack of motility.

### RELATION TO GYNECOLOGY

A paper on enteroptosis presented to a gynecological society would hardly seem complete without some reference to its relationship to pelvic pathology. The subject is of especial importance to the gynecologist, since the majority of the patients that come to him for relief show more or less signs of this condition. Out of 100 patients examined, Mathes

found but 17 who did not show distinct evidence of it. It may form merely the background of the picture which he has before him, or it may be the complete picture without other pathology. At any rate, its frequent occurrence and great importance should be borne in mind in every examination that he makes. To gauge the exact relationship is often a very difficult matter. It is made all the more so when there is present a marked neurasthenia.

It can be practically left out of consideration, as far as treatment goes, in patients presenting neoplasms or pelvic inflammatory diseases. It is, however, of great importance in considering the lacerations, the various displacements of the uterus, as well as that large class of patients presenting pelvic symptoms, so called, with slight or undemonstrable lesion. One should consider the matter of operation in such cases with great care, and be most guarded in his prognosis. Above all, in case operation is done, it is very necessary that a proper course of treatment be carried out afterward, if we expect to get results. We know that enteroptosis and fair health are not incompatible. The enteroptosis may even be of a decided degree, and still the woman go through life comfortably and accomplish her work. It is well to bear in mind, however, that these women, as a class, do not bear the ordinary exigencies of life as well as more vigorous women. Care, excitement, grief, child-bearing, too much work, too little recreation and rest — all are liable to affect her, and are usually the immediate cause of her suffering. As a rule, these patients are conscientious and care-taking — their ambition greater than their strength.

### TREATMENT

Only a word as to treatment, since a discussion of the matter in detail would exceed the limits of this paper. The treatment of enteroptosis should really begin in childhood, and it means all that proper hygiene can do for our children. The outdoor life, the exercise, and school-work should be carefully balanced. A child should be encouraged in the various sports, especially those which develop the chest and the muscles of the trunk. Mathes has laid great stress on the development of the chest in this affection, and it seems to me that he has not exaggerated its importance.

If the woman comes to us already suffering from the symptoms which we have enumerated to us so often, it sometimes seems best to put her immediately to bed. I give them an abundant, easily digested diet, massage, and meet any necessary indications as to bowels and digestion. Pain usually decreases rapidly under this plan.

Following childbirth, great care should be given a woman to see that the care and nursing of her child are not preventing a proper recovery of tissue tone. Practically, this is often very hard to carry out, but the importance of the matter should be carefully explained and every effort made to see to it that the woman has proper care. Maillart ascribes a most happy influence to child-bearing in such patients when properly guarded.

I wish to emphasize the great good that can be obtained from an outdoor life. I advise many of them practically, as I would a patient suffering from tuberculosis. A life entirely in the open air, with forced feeding, will do more for these patients than anything of which I know. If the abdomen is prominent or very flabby, and especially if there is a general abdominal tenderness, so often present in bad cases, and more especially if I find that by standing behind her and placing the hands over the lower abdomen (the patient standing) and lifting up, relief is obtained, I advise a well-fiting abdominal bandage.[1] This sign, called by Glénard "épreuve de sangle," may also be used in the determination of the nature of the pain. If the patient is young and the thorax more or less mobile, I have often given a system of breathing exercises with the idea of increasing the lung capacity and the size of the upper abdomen.

I wish to thank Dr. Henry Hulst of Grand Rapids for his kindness in making the X-ray examinations, and for the many valuable suggestions in connection therewith. I would refer you to his published papers on the subject.

[1] The effect of this maneuver may be seen with the fluoroscope after a bismuth meal. The lower end of the stomach may be raised several inches.

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# FACTS AND FIGURES OF END-RESULTS IN ONE HUNDRED CASES OF CONSERVATIVE OPERATIONS ON THE UTERINE APPENDAGES[1]

By W. P. MANTON, M. D., Detroit

ONE'S point of view regarding any surgical procedure must be largely based on personal experience. A method which proves disastrous in the hands of one man and leads to its denunciation may, under a more careful selection of cases, a keener perception of conditions present, and a more finished technique, give rise to brilliant results and unstinted praise.

The conception of the term "conservative," as applied to the conditions under discussion, may also vary with different operators and thus give rise to confusion. The definition accepted by the writer includes in its meaning all of those procedures directed to the ovaries and tubes in which the morbid process alone is removed, or so modified as to put these organs in the way of renewed physiologic health. This includes puncture and resection, but does not comprehend the breaking up of adhesions and the liberating of organs bound down by adventitious products.

From the above it is plainly evident that the question of benefits to be derived from conservative operations on the uterine appendages presents a problem difficult of solution, which can really be answered only to individual satisfaction.

If it is admitted that the ovaries have their place in the economy, not only as the source of ovulation for procreant purposes, but as purveyors of an internal secretion which is essential to the wellbeing of woman during the active period of life, then there can be no question as to the desirability and importance of preserving the whole or a part of these structures whenever the involving morbid process renders this possible. On the other hand, if it is assumed that beyond supplying the elements for the perpetuation of the race, the ovaries have no other function, their total ablation when diseased is clearly indicated. In the majority of cases of pelvic disease demanding operative intervention, the carrying out of conservative measures cannot be considered, the condition having either existed too long or being of such a nature as to prohibit the saving of even a fractional part of the organ involved. There remains, however, a fair percentage of cases in which the disease is limited, and in which the removal of the pathological process is possible without the destruction or ablation of the entire organ.

Whatever the attitude of mind regarding these matters may be, however, the ultimate results, whether the radical or the conservative operation be undertaken, are alone of value in determining the worth of either procedure.

In order to ascertain my own experience along conservative lines, I have taken one hundred cases from my note-books, the facts and figures from which I herewith submit.

Of the 100 women there were:

| | |
|---|---|
| Single | 30 |
| Married | 64 |
| Not noted | 6 |
| | 100 |

The following operations were done:

ON THE OVARIES

*Resection*

| | |
|---|---|
| Both ovaries in | 17 cases. |
| Right ovary in | 26 cases. |
| Left ovary in | 13 cases. |
| | 56 |

*Puncture*

| | |
|---|---|
| Both ovaries in | 22 cases. |
| Right ovary in | 8 cases. |
| Left ovary in | 14 cases. |
| | 44 |

In 19 women the ovary of one side was found to be so largely involved as to require removal; the right in 6 instances the left in 13.

[1] From the Transactions of the American Gynecological Society, 1906.

ON THE TUBES

*Resection*

| | |
|---|---|
| Both tubes in | 13 cases. |
| Right tube in | 4 cases. |
| Left tube in | 7 cases. |
| | 24 |

It was found necessary to remove 1 tube in 10 of the patients; the right in 4 and the left in 6 cases. The opposite side was left untouched or resected.

*Results.* In the one hundred women the immediate results were entirely satisfactory; that is, all the patients recovered from operation and were relieved from the sufferings of which they formerly complained.

The mortality was therefore *nil*, and the results temporarily perfect. The majority of these patients remained under observation for at least three months. Following this quarter-year, 61 are known to be well at the present time; 31 have been lost sight of; 5 are doubtful, complaining of pelvic pain, referable to the resected ovary, but in which no change can be detected on examination; and 3 have required a second operation for the removal of the conserved organ, which had undergone, in each instance, further cystic degeneration. Of the 64 married women, 5, or 85 per cent, and of the 30 single women, 23, or 75 per cent, were well a year following operation.

Of 64 patients of whom knowledge was had a year or more following operation, 41 are married. Of this number, 6 (14 per cent) subsequently became pregnant; 4 of these were delivered at term, 1 aborted at the third month, and 1 is still enciente.

From this limited number of cases it appears that the conservative operations performed on the uterine adnexa have been followed with satisfactory and permanent results in more than sixty per cent of those patients still alive and traceable. It is quite possible that among the thirty-one lost sight of some may have relapsed and undergone operation at the hands of others. It is also equally possible that the majority have remained well and that some have borne children.

The results just noted demonstrate that the conservative surgery of the appendages, where it can be properly undertaken, is better surgery than total ablation, since it not only relieves from the suffering for which operation is undertaken, and restores the patient to her wonted health, but it maintains intact womanhood, which, in the single who may contemplate marriage, is a matter of no little comfort and importance, and renders in all the possibility of future pregnancy. From the foregoing I maintain that my own statistics and those of others show that the conservative surgery of the ovaries and tubes, having passed the experimental stage, has established itself as a legitimate and successful operation in all the conditions to which it may be properly applied, and that it should be the operation of choice in all instances during the child-bearing age where the diseased state of the organs admits of its employment.

# POST-OPERATIVE EMBOLISM[1]

By EUGENE BOISE, Grand Rapids, Michigan

AN embolus may be composed of air, fat, or blood coagulum, but embolism, as we generally use the term, refers to coagula, and presupposes thrombosis. An embolus is, therefore, broadly speaking, a product of a pre-existing thrombus, and the pathology of embolism is the pathology of thrombosis. An embolus may be so small as to give no symptoms, and thus remain unrecognized, or it may be so large as to cause almost instant death.

Thrombosis may affect either the veins or the arteries. After operations we naturally have local thrombi because of the violence done to the walls of the blood-vessels, but thrombosis may occur at a point distant from the seat of operation. It may, and often does, occur in the right side of the heart, or in the pulmonary artery, or even, though much less frequently, in the left side of the heart or in the aortic arterial system. Also, when the operation is confined entirely to the right side of the pelvis, we may have thrombosis of the left femoral vein, because of blood conditions, of which we shall speak later.

I will ask you to keep in mind the following facts:

1. A thrombus is a stationary, localized blood coagulum within a blood-vessel.

2. Normal blood will not coagulate in normal blood-vessels.

3. To produce a thrombus, there must be a change from the normal, either in the blood or in the blood-vessels, or in both.

4. Fibrin, which is the groundwork of a thrombus, does not exist in normal blood, but is the product of the reaction of fibrin-ferment on fibrinogen.

5. Fibrin-ferment is, in turn, the result of a combination of the normal calcium salts of the blood with the pathological element, nucleoproteid.

6. This nucleoproteid, according to the best authorities (1), is produced by the degeneration of leucocytes and blood-plates. Therefore the three elements necessary to the formation of a thrombus are fibrinogen and calcium salts, which are always present in normal blood, and nucleoproteid, which is never found in normal blood.

7. There is, in normal blood, a power which enables it to neutralize or dispose of a certain amount of this nucleoproteid. It is thought that this power is derived from the endothelial cells lining the vessels. These cells are nourished by the blood circulating in the vessels, and are sensitive to changes in this blood.

Those conditions of the blood-vessels predisposing to or necessary to intravascular coagulation are those which impair the integrity of these lining cells, such as:

1. Traumatism (ligatures, crushing, etc.).

2. Inflammation or local septic conditions that impair the integrity of all the coats of the vessels.

3. Pressure, by which the blood flow is retarded and the nutrition of the endothelial cells is impaired.

4. Retardation of rate of flow of blood.

Haward, in his recent Hunterian lectures (2), says anything that retards the flow of blood through the heart or vessels predisposes to thrombosis, or may even determine it, because the nutrition of the cells is thus impaired. In fact, he distinctly says, "In most cases, diminution in the velocity of the blood flow is the proximate cause of thrombosis."

Osler, as quoted by Haward, gives the history of the formation of a thrombus as follows: "First, the impairment of the integrity of the inner coat of the vessel, from whatever cause. Then the rapid collection of blood platelets at this point, where they fuse together into a granular mass. The leucocytes quickly gather, and soon fibrin filaments shoot out in all directions."

Osler saw no evidence of the disintegration of leucocytes, but most investigators (3) mention disintegration of leucocytes and blood-plates as the source of the nucleoproteid which is necessary to the formation of the thrombus. Any excess of this nucleoproteid over what

[1] Read at the meeting of the American Gynecological Society, Hot Springs, Virginia, May 22, 1906.

the blood can neutralize renders the entire body of the blood more coagulable.

If the thrombus is not infected, it may become organized into a fibrous mass, or it may gradually and harmlessly be removed by disintegration. Before either of these processes is completed, a portion of the coagulum may become separated, and an embolus result.

Certain morbid conditions, apart from injury to the vessels, seem to be of influence in the formation of a thrombus. As I have said, Haward lays considerable stress on retardation of the flow of blood.

Sepsis may increase coagulability, presumably by causing disintegration of leucocytes, and setting free nucleoproteid, as also by introducing foreign bodies in the guise of micro-organisms.

Blood saturated with carbonic acid is much more coagulable than arterial blood. Anæmia and chlorosis, also, are generally believed to increase coagulability.

Krehl says (4): "From the fact that patients with chlorosis show a tendency to the formation of venous thrombi, it has been assumed that their blood contains large amounts of fibrin-ferment; an assumption, however, which is incorrect."

Haward attempts to explain it by the statement that the increase in the number of the white corpuscles and blood-platelets, together with their slow movement along the walls of the vessels, "favors thrombosis." He concludes as follows: "It would seem, then, that thrombosis may depend upon a variety of conditions, and is usually due to a combination of several; lesions and degenerations of the vessel-walls, impaired nutrition of the endothelium, retardation of the blood current, changes in the composition of the blood and in the proportions of its formed elements, the invasion of micro-organisms—any or all of these may play a part in the process, the predominant factor varying."

Haward also quotes Professor Wright and Dr. H. H. G. Knapp (5) as having proved not only that the blood of convalescents from typhoid fever is much more coagulable than normal, but that it contains twice as much lime salts, and implies that its increased coagulability is due to this fact.

All these conditions increase the coagulability of the blood, and thus tend to the production of thrombi and resultant emboli.

Following abdominal and pelvic operations there are naturally thrombi in the vessels at the points of violence, from which emboli may be carried to the lungs.

In the femoral veins we also frequently find thrombi from which emboli may be detached. And it is by no means unknown that in the branches of the pulmonary artery thrombi form. Dr. G. Newton Pitt (6) found 40 cases in 3,218 autopsies. In fact, Playfair (7) attempted to establish it as a rule that seizures such as we generally attribute to pulmonary embolism were due to pulmonary thrombosis if they occurred before the fifteenth day after delivery. If after the nineteenth day, they were due to embolism.

Not only do we find thrombosis of the pulmonary artery, but not infrequently we have a clot forming in the heart and extending into the artery before death. And this condition is, in the great majority of cases, on the right side, obstructing the pulmonary artery. From this portions may be broken off and carried to the lungs, causing almost instant death; or through gradually increasing obstruction of the pulmonary artery, by enlargement of the heart-clot, death occurs, but more slowly.

We may, and do, find a thrombus also occasionally in the left ventricle, from which emboli may be carried to any part of the arterial system. Dr. Baldy reports a case of gangrene of the arm following an abdominal operation. Dr. Richard Smith reports a case of gangrene of the leg following an operation for appendicitis. Others have reported similar cases.

Now, in the light of the above facts, let us analyze the conditions that meet us in our abdominal work.

Numerous arrays of statistics show conclusively that of all surgical operations, those connected with the pelvis show the greatest proportion of emboli following operation, and that of these, much the greater number are after operations for fibroids.

After all operations, there is, of necessity, a thrombus or thrombi at the points of violence to the veins. If these thrombi remain local, we need not greatly fear embolism, but if, by

reason of blood conditions, or an impaired state of the walls of the veins, these thrombi extend till they perhaps meet a larger vein, through which the blood is flowing freely, the danger of embolism is much greater. In addition to this, if we have a weak heart, there is added a possible danger of heart-clot.

Krehl (8) says that "marked general anæmia weakens the heart, either through degeneration or malnutrition." He also says (9), "If the ventricle is weakened, it does not contract as completely as normal" (never emptying itself completely). He also says, "The result of weakening both ventricles is diminished arterial pressure, with increased venous pressure and diminution in the rate of blood flow."

Haward (10), as I have shown, places marked emphasis on retardation of the blood current as a determining factor in thrombosis. But, besides the weakening of the heart through general anæmia and exhausting disease, we have often the added factor of the degeneration of the heart muscle which accompanies or results from uterine fibromata.

Increase of the amount of the calcium salts in the blood increases the coagulability of the blood. The relative amount of the calcium salts in the blood of patients submitting themselves for abdominal operations has never been studied, as far as I can learn, but we know the great tendency of fibroid tumors to calcareous degeneration, and it is a fair inference that in the blood of all patients suffering from uterine fibromata there is an excess of calcium salts. Moreover, that this condition may readily exist in other pathological conditions may easily be inferred from the numerous instances of calcification given by Dr. Frank T. Andrews, in a paper read before the Chicago Gynecological Society in November, 1905 (11):

We have, then, in many of the cases presenting themselves for operation, as conditions provocative of thrombosis and of pulmonary embolism:

1. Chronic exhausting diseases, with their resultant anæmia and leucocytosis.

2. A probable frequent increase of the calcium salts in the blood.

3. The presence of nucleoproteid in the blood as a result both of the increase of leucocytes and blood-plates and of traumatism.

4. Degeneration of the heart muscle as a result of general chronic anæmia and of fibroid tumors, with its consequent residual blood in the ventricles and retardation of the blood current.

Therefore it can easily be understood how a thrombus may form in the pelvic veins, the pulmonary artery, the right side of the heart, the left femoral vein, even as a result of an operation on the right side of the pelvis, or in the left side of the heart, or somewhere in the course of the arterial system. There is, perhaps, weakness of the heart, with consequent retardation of blood flow. The blood carries an excess of calcium salts and nucleoproteid, and a very slight exciting cause may be all that is needed to precipitate a thrombus. This is supplied by a localized imperfection or fault in the endothelial lining, which may be in the heart, the arteries, the femoral vein, or elsewhere. Given this, with the specified blood conditions, and the process of thrombus formation described by Osler will take place.

The symptoms of pulmonary embolism are generally sudden in onset. They are dyspnœa, pain, cyanosis, and rapid, often irregular, action of the heart. They necessarily vary according to the size of the embolus. Small ones cause sudden symptoms, more or less severe, which generally pass away with but temporary disturbance. Large ones may prove so rapidly fatal as to preclude all treatment.

Inasmuch as the pulmonary artery is not the channel of nutrition of the lungs, there are no symptoms of resulting gangrene or abscess, except in septic cases.

### IS THERE ANY WAY BY WHICH WE CAN DIAGNOSE, BEFORE OPERATION, POSSIBLE THREAT OF EMBOLISM?

Mahler, in speaking of puerperal embolism, has called attention to rise in the maternal pulse as being the first sign of thrombosis.

Richter (12) thinks this was demonstrated beyond doubt in 63 per cent of his cases. In 34 per cent there was some doubt, because of the presence of fever.

Krusen (13) has suggested an examination of the blood prior to operation, presumably with reference to excess of leucocytes and blood-plates, and possibly with especial reference to an increase of calcium salts.

I would also suggest careful examination of the heart with reference to possible undue weakness. If the area of dullness is somewhat increased, if the first sound is disproportionately weak, if, after exertion, the pulse-rate is greatly increased, due allowance being made for existing anæmia, and if there is a history of chronic exhausting disease, we may justly diagnose degeneration of the heart muscle, whether we detect any atheroma of the peripheral arteries or not. If, in addition to this, we find an excess of calcuim salts, with chronic anæmia, we are justified in taking all possible precautions against the occurrence of embolism.

### WHAT SHALL THOSE PRECAUTIONS BE?

In all cases of chronic disease, where the indications for immediate operation are not imperative, we must give more time and attention to the preparation of our patients. We must attempt to improve the blood, increase elimination, and build up our patients in every possible way. At the same time we may attempt to decrease the coagulability of the blood. I have mentioned that in a series of experiments on convalescents from typhoid fever, Professor Wright and Dr. H. H. Knapp found increased coagulability with twice the normal proportion of calcium salts. They state that in a series of cases, "in all of whom the blood was found to be abnormally coagulable, it was observed that the administration of citric acid (36 grains three times a day) was followed by a decalcification of the blood and a corresponding diminution in its coagulability."

Professor Wright has also shown that the coagulability of the blood is diminished by the ingestion of alcohol and large quantities of water.

Dr. B. W. Richardson (14), as quoted by Haward, shows by experiment that tobacco-smoking markedly decreases the coagulability of the blood. After a long day of smoking, it refused to coagulate at all, when, in the same patient, blood drawn in the morning, before any smoking, would coagulate in two minutes.

Haward gives the following lists of conditions influencing the coagulability of the blood, which may be somewhat helpful.

It is increased by—
Carbonic acid;
Lime salts;
Milk (because of the lime it contains);
Magnesium carbonate;
Restriction of fluids.
It is decreased by—
Oxygen;
Alcohol;
Restriction of food;
Diminution of lime salts;
Large quantities of fluid;
Citric acid;
Rhubarb;
Acid fruit juices;
Acid wines; and
Tobacco-smoking.

If, before or after operation, it shall seem desirable to give the patient free quantities of milk, it may be decalcified, if desired, by the addition of citrate of soda, 20 to 40 grains to the pint.

At the time of operation, avoid all possible loss of blood. Be as gentle in the necessary manipulations as is consistent with thoroughness.

After operation, keep "in touch" with the heart's action. Keep your patient quiet, avoiding sudden movements or movements that will put pressure on the pelvic veins. Keep the bowels well open with mild laxatives to avoid straining, and use normal saline solution to dilute the blood and aid in eliminating calcium salts.

### HOW EARLY SHALL THE PATIENT BE ALLOWED TO GET OUT OF BED?

Each case must be a rule to itself. Some surgeons think that where the musculature of the heart is in process of degeneration, heart clot is more probable if the patient remains quietly in bed (though the danger of embolus may be lessened), because the contractions of the heart are less vigorous, the ventricles never completely emptied, and the residual blood becomes very prone to coagulation; also, that this danger is to a certain extent averted by the stronger and more complete contractions induced by the upright posture and physical exertion.

When pulmonary embolism occurs, the

most promising remedy is the free administration of oxygen, in the hope that the patient may thus be kept alive till the immediate shock has somewhat passed and the other branches of the pulmonary artery have adapted themselves to the changed conditions.

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# DEPARTMENT OF TECHNIQUE


## WESTERN RESERVE UNIVERSITY

**Department of Surgery**


## TREATMENT OF TRAUMATIC ŒSOPHAGEAL STRICTURE BY DILATATION

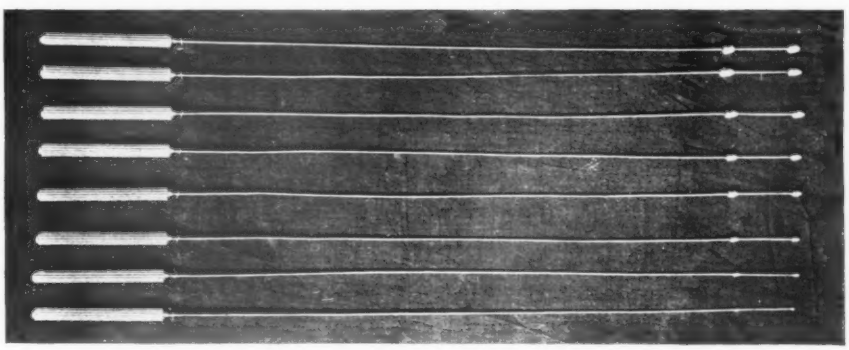

By F. E. BUNTS, M. D.


The treatment of œsophageal strictures of a non-malignant type has, if we may judge from recent literature, resolved itself largely into that of operation in the cases of great severity.

The operation may be a simple gastrostomy, or, associated with the gastrostomy, retrograde dilatation is attempted. I do not feel qualified to speak of the practical results following retrograde dilatation, for I have never attempted it, but it has seemed to me that if we could produce even a symptomatic cure without danger to the patient, it would be preferable to incurring whatever risk might be attendant upon the operation.

I have now had a series of nine cases of stricture of the œsophagus, all following the drinking of lye. Some of the patients were children, some adults, and in all, the stricture was a very small one, so that in most of them the passage of even a filiform bougie was accomplished after several days of patient effort, and in several, total inability to swallow water was present, so that they were in an extremely bad condition.

I found it impossible to get œsophageal bougies small enough for the class of strictures I encountered, and therefore I have had made a series of graded double-bulbed olive-shaped bougies, which are here illustrated, and which have given me much satisfaction. It will be observed that on each staff there are two bulbs, the first being one size of the French scale, smaller than the second bulb. This serves to permit one to follow up the advantage gained by passing one bulb, by the immediate passage of one a size larger. Another advantage of the double bulb is that the passage of the first bulb is followed by a free passage of the intervening portion of the bougie until the second bulb is engaged in the stricture, making one feel safer in applying a moderate degree of pressure in pushing this one through. Sometimes it will be impossible to increase these sizes more rapidly than one or two of the French scale in every three or four days; at other times we may succeed in dilating it several sizes each day. Much depends upon the degree of stricture and the depth of the original injury.



Double-bulbed œsophageal bougie.

Great gentleness and care are required, and if

one meets with repeated lack of success one day, it is better to allow the patient to rest for a day or two, if his state permits it, and then try again. In children I have found it necessary to use a mouth-gag; in adults this has not been necessary. On inserting the bougie, it is best to have the patient sit upright, in a straight-backed chair, the head thrown back somewhat, in order to straighten the line of introduction of the bougie. Instead of passing it directly back in the median line, it is probably best to pass it into the pyriform sinus at the side of the larynx, which affords a funnel-like aperature that will allow the bougie to slide into the œsophagus without encountering the bodies of the cervical vertebræ or the cricoid cartilage. Force should never be exerted.

I speak of symptomatic cure, because it has been the exception in which the œsophagus has been dilated to its normal size, but the patients have been able to eat soft food readily, and with a little care in mastication are able to eat all kinds of solid foods, so that without exception they have increased rapidly in weight.

Among this series of nine cases was one of nineteen years' standing, during which time no solid foods had been eaten, and though but twenty-four years of age at the time I saw him, he had lost all his teeth. After dilatation he was able to eat freely of solid foods. The last case that I have treated is still under my care, and was one in whom a gastrostomy had been previously performed. Though unable to swallow water when she first entered the hospital, she is now able, after carefully chewing her food, to eat anything she wishes.

After securing a free dilatation of the œsophagus, the patient may be furnished with a bougie for his own use, and by passing it once in a month or more, all danger of return of the stricture is obviated.

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# TECHNIQUE OF TUBATION OF THE PHARYNX TO FACILITATE ADMINISTRATION OF ANÆSTHETICS AND TO PREVENT INHALATION OF BLOOD IN MOUTH AND FACE OPERATIONS

By JUNIUS H. McHENRY, M. D., Cleveland, Ohio
Visiting Surgeon to Charity Hospital Dispensary

During my term as resident surgeon at Lakeside Hospital, and while on the service of Dr. George W. Crile, we had occasion to operate upon many cases of cleft palate and malignant tumors of the head and neck.

It is always extremely important in such operations to have a clean field. The greatest hindrances to operative technique are those of hemorrhage, aspiration of blood, the position of the head, and the annoyance and delay caused by the inhalation cone of the anæsthetist.

To meet these objections and facilitate the administration of the anæsthetic, Dr. Crile devised a means of tubation of the pharynx (1), previously briefly reported by him, which article I have made free use of in this paper. It is through his kindness, therefore, that I am permitted to emphasize more fully the simple technique, and at the same time present a cut showing the method as employed.

The surgeon, I believe, will readily see the great advantage and assistance this method will be to him in all head operations, particularly those upon cleft palate. Its importance will accordingly be appreciated, not only by the surgeon himself, but certainly by the anæsthetist.

Through its use we simplify what has heretofore been at most times a difficult, and at all times a tedious, operation; one accompanied with many unavoidable interruptions to the operator, as well as dangerous complications to the patient, transforming an operation of frequent breaks in its operative technique into one as simple in character as a herniotomy. To make clear the steps in the technique, they are enumerated as follows:

1. The patient is reduced to complete surgical anæsthesia.

2. The pharynx is then cleansed with a small

gauze sponge held by a pair of forceps and then cocainized with 1-10 per cent solution cocaine.

3. Two drainage-tubes as large in caliber as will pass, cut on the bias, and fenestrated near the ends, are inserted into and through the nares as far back as the epiglottis.

4. The mouth is then widely opened, and the tongue drawn well forward and out.

5. With one good-sized gauze sponge the entire pharynx is then packed, while making traction upon the tongue, as far back as the tubes which form, when in position, an air-chamber or space in which the tubes and larynx communicate.

6. The tubes, having been inserted as directed in 3, are severed at equal distances from the nose.

7. The anæsthetist listens carefully to ascertain if the patient is breathing through the tubes.

8. The tubes are now joined by a Y-shaped glass tube to which is attached, by means of another rubber tubing, a gauze-covered funnel. (See cut.)

9. The anæsthetic, chloroform or ether, is then administered by pouring it upon the gauze-covered funnel.

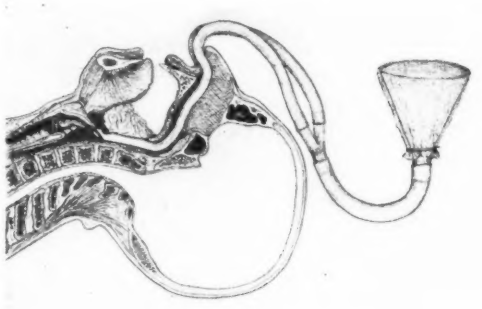
Many devices have been suggested and used to facilitate mouth and head operations, in order to minimize the danger of aspirating blood during gerenal anæsthesia, but none that I know of have given the satisfaction, as the one just described has, nor are any as simple as it is.

Herzog (2) suggests the intubation method, which consists, first, in intubating the patient, then connecting the intubation-tube with a tightly fitting end-piece with a rubber tube passed through the nose. That is a more difficult procedure, and the anæsthetic is given through one tube instead of two.

Mosher (3) and Heineberg (4) recommend a new device for administration of ether spray in certain head and neck operations. It is, however, the omission of the cone and apparatus in such operations, causing the disagreeable complications and vexatious delays, which is of great importance to the operative technique.

The old method of tracheotomy with anæsthesia through the tracheal opening or tracheotomy-tube is no longer necessary. In operations upon the tongue or jaws, which have always been attended with great difficulty on account of blood, the surgeon is now enabled to operate upon an almost clean field at the same time, unobstructed and unhindered by the cone of the anæsthetist.

Vomiting, a positive result of incomplete and uneven anæsthesia, and a source of great annoyance to the operator, and danger from aspiration to the patient, is now practically impossible. The mucus which usually forms in the throat is absorbed by the gauze sponge. Not only does



this gauze sponge act as a plug, preventing the escape of blood into the air-passage, and, *vice versa*, the spraying of mucus over the operative field, but a further function of hæmostasis is caused by its pressure upon the base of the tongue, controlling to a great extent the hemorrhage, except in operations where the lingual arteries are severed.

The position of the head in all operations upon the head or mouth is another difficult problem. It is usually placed in a lower plane to that of the body, or in a pendent position, according to Harte (5). With the use of the method described, the head may be placed in any position most advantageous to the operative technique, regardless of the hemorrhage resultant from the operation.

The fact of the anæsthetist being removed at all times from the field of operation will, in itself, appeal to the surgeon familiar with operations upon the mouth and head, and will at the same time be welcomed by the anæsthetist, who labors under many disadvantages and vexations in head operations.

## CONCLUSIONS

The advantages to be gained by the tubation method are, therefore, as follows:

1. Complete, uniform, and continuous anæsthesia.
2. No vomiting, coughing, or spraying of blood over the field of operation.
3. Aspiration of blood impossible.
4. Partial control of hemorrhage.
5. Position of head optional to operative technique.
6. No interference or delay from anæsthetist.

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## WESTERN RESERVE UNIVERSITY

### Department of Gynecolgy

# NORMAL SALINE SOLUTION IN ABDOMINAL OPERATIONS

By WILLIAM H. HUMISTON, M. D., Cleveland, Ohio

Associate Professor Gynecology, Western Reserve University; Gynecologist to Charity Hospital; Consulting Gynecologist, City Hospital

I vividly remember a case at the City Hospital several years ago, that had been suffering for months from pelvic abscesses until strength and endurance was wellnigh exhausted, and from all appearances would not live long. I determined to operate upon this case through an abdominal incision. I found the omentum and intestines matted together, and covering the pelvic organs. After ligating and cutting away a portion of the omentum, I separated the intestines from the uterus and the masses surrounding, which were composed of tubo-ovarian abscesses. Packing off the general abdominal cavity with gauze sponges, I proceeded to remove these suppurating tubes and ovaries, leaving quite an expanse of denuded tissue. Up to this time, in similar cases, it had been my practice to put in a drainage-tube. But as the patient's after-care would devolve upon untrained nursing, I hesitated, as I felt that the chances for a new infection would be greater, through the frequent change of dressings to empty the tube, than to take the chance of closing the abdomen without drainage. After thoroughly flushing out the pelvic cavity with warm normal saline solution, I decided to leave a liter of the solution within the abdomen and close it. I did so, and you can imagine the anxiety I experienced for the succeeding seventy-two hours, expecting a chill, rise in temperature, vomiting, and ileus. The facts are, I never had a case do better or have fewer unfavorable symptoms. Thereafter all similar cases at the hospital were given from 1½ to 2 liters of saline solution, and the abdomen closed without drainage; while similar cases in my private hospital, where I had trained skillful nursing, were drained and no saline solution left in the abdominal cavity.

The non-drainage cases, with normal saline solution and only ordinary nursing, did better than the cases that had drainage with trained nursing, and the mortality was less. This experience led me to the use of normal saline solution in all my abdominal cases, except those of total hysterectomy, and the cases in which the Mikulicz tampon was used. I felt the loss of the saline solution in these cases of extreme debility brought about by prolonged suppuration, or by intra-abdominal hemorrhage from ruptured ectopic pregnancy.

Many of these cases come to the surgeon *in extremis*, and there is but one way, that I know of, to carry them safely through the shock of an operation and an hour's anæsthesia, and that is, to begin the submammary injection of warm normal saline solution at the commencement of anæsthesia and keep it up throughout the operation, and in this manner succeed in introducing from 1½ to 2 liters of this life-saving fluid.

Since adopting this method I have saved the lives of many cases thought to be inoperable owing to the little vitality left. Is there any other method so readily and safely used as this? Many times have I seen these cases, after completing a major operation, leave the operating-room in better condition than they had been for hours before, and the convalescence was usually uninterrupted.

The danger attending the intravenous injection is considerable, and is more complicated than the submammary method. The latter can be administered by any physician, while the former requires an experienced surgeon. All these cases of prolonged septic infection have crippled kidneys, evidenced by diminished function, and the urine contains albumin, granular-hyaline casts, and frequently pus. The large quantity of saline used increases kidney activity, and there is also an increase in the solids excreted, which soon results in a marked change in the patient's condition. The heart is strengthened and the pulse-rate is lowered. The intense thirst is overcome and the activity of the skin increased.

Whether you use the saline in the abdominal cavity before closing the incision, or by the submammary method during the operation, or a combination, the technique is simple. Intra-abdominally, after inserting the sutures and tying about one half of them, I pour into the cavity, through a funnel, about three pints of normal saline solution at a temperature of 112° F., and quickly tie the remaining sutures. In a few moments you notice a marked change in the character of the pulse, its rate diminishing, lowering tension and increasing fullness. The facial color more nearly approaches the normal, and, as a rule, the patients suffer but little from thirst, the tongue remaining moist until the stomach is able to absorb

fluids. In vaginal cœliotomies and hysterectomies, where this method cannot be employed, I prefer to have the saline administered by the submammary method as soon as the patient is placed upon the table. The trocar is plunged beneath the breast at the outer and lower border, and the saline is allowed to enter under a moderate pressure, from a three-foot level above the position of the body. During an operation requiring from thirty to forty-five minutes, you can introduce from two to three pints under one breast. This amount can be increased by using two canulas, one under each breast.

In emergency work outside of the hospitals, and where trained assistants are limited, and sterile saline solution is not to be obtained, I have used a hastily prepared non-sterile salt solution during an operation by allowing the sigmoid and colon to be slowly filled with the fluid. This is readily accomplished with the patient in the Trendelenburg position, and the peritoneal cavity opened to permit of the ready guidance of the tube above the pelvic brim. Large quantities may be used in this manner without hindrance in the field of operation, and the rapidity of absorption can only be appreciated by actual observation.

I have never had a bad result which could be attributed to the use of the saline, and I believe I have saved numerous cases that would have been lost without its aid. I do not believe there are contraindications to its use in these cases of low vitality. I am certain that many cases of sepsis, of intra-abdominal hemorrhage, of septic nephritis, and of low cardiac vitality have been saved. I will detail a few cases to better illustrate the results obtained from using the salt solution.

CASE 1. June 18, 1897. Mrs. P., aged 50 years, had a tremendously large ovarian cyst, which had become adherent to almost all the structures within the abdominal cavity, excepting the spleen and the left kidney and the anterior abdominal wall, the latter escaping through the intervention of the omentum. The cyst was a large multilocular one, containing the products of suppuration familiarly know as "pea-soup."

After the contents had been carefully and slowly withdrawn, and the cyst-wall freed and removed, the patient suddenly collapsed. During the flushing of the peritoneal cavity the patient recovered slightly, and it occurred to me to leave some of the fluid to replace the weight which I had removed. Four quarts were used. She was placed in bed in an almost moribund condition, but in a very few minutes the rapid pulse was again felt. Within an hour the rate could be readily made at 160, and it gradually dropped to 90 within the first twenty-four hours, and the patient made a rapid and uninterrupted recovery.

CASE 2. Mrs. L. J., aged 34 years. The history and clinical picture made the diagnosis of extra-uterine pregnancy with internal hemorrhage positive. Dr. F. S. Clark, who first saw the case, called me to operate. I found the patient in an extremely low condition, with sighing respiration, blanched skin, cold extremities, and small feeble pulse whose rate was scarcely distinguishable at 170 to 188; temperature 95°; axilla.

As soon as partial anæsthesia was induced, the introduction of salt solution beneath the breast was begun, and when the patient was taken from the table, two quarts had been given, and most of it had already been absorbed. The placenta was found attached to the posterior surface of the broad ligament and to several coils of small intestine in the cul-de-sac. The posterior wall of the gestation-sac was coherent to the colon and small intestines. In the abdominal cavity there were clots, in various stages of organization, representing the different periods of previous ruptures. Ligatures were immediately placed on the ovarian artery, and a clamp applied over the tube and broad ligament along the left side of the uterus. With the checking of the main blood-supply, the fœtus and the various blood-clots were removed from the pelvis and the placenta was carefully detached. The posterior wall of the gestation-sac was carefully handled, with a view to leaving it as a shield for the general abdominal cavity. No attempt was made to clean the general peritoneal cavity, but as much salt solution as the space would contain was poured into it, and left when the stitches were tied. The posterior wall of the gestation-sac was sewed to the upper portion of the wound in the abdominal wall, and the cavity of the gestation-sac was packed with gauze to control the general oozing.

The patient's condition when first placed upon the table was very precarious, but with the absorption of the salt solution beneath the breast, and the use of the strychnine sulphate, one fifth grain, the pulse gradually grew stronger and fuller, and at 4 P. M. was 140 in rate. One half-pint of salt solution was given per rectum every hour, one thirtieth of strychnine every two hours, and four minims of fluid extract of digitalis each four hours, hypodermatically. At 7 P. M. the pulse again began to waver, and again a subcutaneous injection of two quarts of salt solution was given, and at midnight the pulse was 160 and rapidly growing stronger and slower. Twenty-four hours after operation it was 128, and never again went above this point. The stomach was irrigated

thirty hours after the operation, and undigested food, with a large amount of raspberry-seeds, was removed. The nausea ceased, and nothing further complicated convalescence.

The rapidity with which this patient responded to the use of submammary injections of salt solution when the conditions seemed most hopeless, and the ease with which the general peritoneum cared for the blood and clots that were left in the cavity, are the two important facts to be deduced.

CASE 3. Mrs. A. G., aged 23 years, came into the hospital with a tentative diagnosis of old ruptured tubal pregnancy with general pelvic peritonitis. The usual landmarks were obliterated, and the pelvis was cleared with great difficulty. The rectum was accidentally torn, and it was found necessary to resect about three inches of it, making an end-to-end anastomosis. The patient was given two quarts of saline under the mammary gland during the operation, with good results, noted in the condition of the pulse. A Mikulicz tampon was placed in the pelvis to control oozing, and to protect the rectum at the junction of anastomosis, and two quarts of saline were placed within the abdominal cavity. The greater portion of this was drained through the Mikulicz, the gauze dressing being changed frequently. The patient passed through the first twenty-four hours in fair condition. The pulse, weakening twelve hours after operation, was readily helped by a quart of saline, given subcutaneously. From this time the patient steadily improved toward convalescence without an untoward symptom.

The cases detailed are sufficient to show the range of applicability of this invaluable agent. I have used it in those extreme cases of prolonged pelvic suppuration where the vitality was so low as to preclude the possible hope of recovery, beginning its introduction subcutaneously, after partial anæsthesia, and continuing it throughout the operation, with the effect to *prevent shock* or seeming loss of strength, as in many instances the patient left the operating-table with a better pulse than at any time noted for days before.

I have given you but the clinical experiences that I have enjoyed in the use of normal saline solution. The theories and speculations in regard to its action and results are well sustained by extensive laboratory experiments upon animals, as well as by a large clinical experience upon many patients. That it has a wide range of applicability I believe all will agree.

I append a portion of the report of Dr. John G. Clark, professor of gynecology in the University of Pennsylvania, as appears in the January 30, 1904, number of the *Journal of the American Medical Association*.

"In these experiments there were 25 test animals, and a control animal was used for the first eleven injections. The next 13 animals were injected in rapid succession. No control animal was used; but with the twenty-fifth animal, fearing that the stock culture might have decreased somewhat in virulence, another control animal was injected, with the same lethal result. Of the 12 control animals employed, all died, the average length of life being a little over thirteen hours ($13\frac{1}{3}$). Of the 25 test animals (those in which salt solution was used together with the micro-organisms), 11 are living and well (44 per cent). The average length of life of the test animals that died was 83 hours as against $13\frac{1}{3}$ hours in the control animals.

"From this review of our experimental work the evidence is conclusive that a large percentage of the animals in which the normal salt solution was injected immediately after the bouillon culture of staphylococcus aureus was saved by this means."

It has been asserted that the distribution of infectious matter within the peritoneal cavity is not only valueless, but very dangerous. From a clinical standpoint we have amply proved that the latter statement is ungrounded; for in a series of 254 laparotomies, in which peritoneal infusions were very largely employed, only 7 deaths occurred. In one, a case of general miliary tuberculosis of the peritoneum, death occurred two months after the operation, from a general involvement of the lungs and other organs of the body. The second was a case of cancer of the cervix, in which panhysterectomy was performed; no salt solution was used, as the pelvic diaphragm was not completely closed, and therefore the solution would not be retained. In this case the patient died within twenty-four hours after the operation, from pulmonary emboli. The third was general purulent peritonitis; the patient was *in extremis* at the time of the operation, which was hastily performed, in the vague hope that she might be saved. Death occurred, however, before the patient reached the hospital ward. In the fourth, a case of general cancer of the peritoneum, only an exploratory laparotomy was performed. No infusion was employed, because the peritoneum was already overtaxed and unable to free itself of ascitic fluid. This patient died one week later, from the general progress of the disease.

As will be seen from the brief statement of these four cases, the use of the salt solution had nothing whatever to do with the death, for in two of the cases it was not used, and in the other two in which

it was employed no ulterior effect could be ascribed to it; for the patient, suffering from general tuberculosis, survived for two months after the exploratory incision, and the second expired on the operating-table.

The three remaining cases were as follows: In one, patient suffering with a large cystic myoma, death occurred within twenty-four hours after the operation, from a virulent fulminating streptococcic infection. This case showed the most intense toxic symptoms, and death came with the rapidity which is so characteristic of this fatal poison. In this case, certainly the salt solution in no way retarded the progress of the symptoms. This case also proves the point which we have insisted on, namely, that, given a virulent streptococcic infection, in some instances practically nothing which we know of can save the patient. In the next case, the patient was operated on for chronic appendicitis, with extensive adhesions, and right-sided salpingitis; death occurred on the fourth day, from intestinal obstruction. The last case was one of hepatosis, in which the liver had gravitated below the umbilicus. The patient was greatly jaundiced, and kept quietly in bed for a month, when the jaundice subsided to a sufficient degree to permit the performance of the operation. The liver was suspended, and packing was introduced between the anterior abdominal wall and the liver for the purpose of producing adhesions. In this case the patient again became progressively jaundiced, and died on the fourteenth day after the operation.

From this review of the seven fatal cases, only one could in any way be attributed to the use of the saline infusion, in the sense of distributing the poison to the remoter parts of the peritoneum and the general organs of the body.

From this combined clinical laboratory study it is evident that the assertion that the use of peritoneal infusions is not beneficial, but actually dangerous, has been amply refuted. In the laboratory experiments we saved forty-four per cent of the animals in which the same amount of virulent culture was introduced in the control and test animals. In the first, all the animals died; in the second, four per cent were saved, and the resistance to the poison in the fatal cases in which the salt infusion was used is shown by the fact that the average life was 69 hours longer than in the control animals.

## CONCLUSIONS

From this study we would draw the following conclusions:

1. The use of salt solution does not increase, but unquestionably minimizes, the dangers of pyogenic infection.

2. In addition to the reduction of mortality, the convalescence of the patient is rendered infinitely more comfortable and satisfactory, through the reduction of thirst, the increase in the urinary excretion, and the minimizing of vesical irritation.

# EDITORIALS

SURGERY, GYNECOLOGY AND OBSTETRICS

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JULY, 1906

## SURGICAL PHYSIOLOGY

In the earliest period of its development, surgery was wholly empiric. The period of gross anatomy which followed gave rise to a splendid development of the mechanics of surgery, a development that long ago reached its zenith. Gross anatomy led to the unfolding of minute anatomy and pathologic anatomy. Upon this foundation was erected the splendid structure of surgical pathology and bacteriology. Previous to this time, surgery, like law, was taught and practised largely by precedent. Surgical pathology and bacteriology transformed the old anatomic surgery.

Morphologic pathology has reached a high development; has possibly almost reached its zenith. There has been recently, and perhaps at no time greater than now, a tendency to drift from the study of morbid form to pathologic function. In other words, pathology is rapidly losing itself in biochemistry or pathologic physiology.

The approximate causes of the majority of the surgical diseases are now known, or correlated; but what can we say as to the development of our knowledge of the vital processes of surgical importance? We know the gross and minute appearance after death. What knowledge have we of the physiologic alterations leading up to death or recovery, or of the wonderful scope and method of compensation in injury and disease, or of the local and of the general resistance toward infection? The ever-widening field of serum therapy which at present holds out so much hope in the prevention and treatment of several diseases now classed as surgical infections is pre-eminently one of pathologic physiology. Vaccinations against infections, the serum treatment of Graves's disease, a hint at the immunity in mice against cancer—all indicate the direction of the deeper currents of surgery. We have seen important diseases transferred from the internist to the surgeon; we are quite likely to witness a reversal in the pending investigations in pathologic physiology.

The physiological laws and phenomena which concern surgery may be properly designated surgical physiology. Courses of instruction are already begun in this most fruitful and fascinating field, and we may soon see fulfilled the prophetic words of Virchow, published in 1847: "The standpoint we aim to occupy is simply that of natural science. Practical medicine, the applied theoretical, the theoretical pathologic physiology, is the ideal we shall strive to reach, so far as our powers permit. While we recognize fully the title and the independence of pathologic anatomy and of the clinic, they serve us pre-eminently as sources of new questions, the answers to which fall to the lot of pathologic physiology. Inasmuch, however, as these questions, to a large extent, may be formulated only through painstaking and comprehensive detailed study of

manifestations of disease in the living, and of the conditions in the dead, we regard the exact growth of anatomic and clinical experience as the first and most important demand of the present time. From an empiricism of this kind will result gradually the true theory of medicine, pathological physiology." Along the lines of pathologic physiology the next great advances in surgery will probably be made.

GEORGE CRILE, M. D.

## THE LYMPHATIC SYSTEM IN SOME OF ITS RELATIONS TO PRACTICAL SURGERY

The numerous relations of the lymphatic system to clinical medicine and surgery have for a long time received the deserved attention of clinicians.

Many pathological processes, neoplastic as well as inflammatory, extend or give metastasis by way of these channels. The pathologist, as well as the practitioner, must devote attention to this part of the vascular system, and the operating surgeon is forced to a thorough study and appreciation of this subject, in order that his efforts in the alleviation and cure of malignant disease may be rational and correctly carried out; he consequently considers with interest the topography of the lymphatic apparatus, in the knowledge of which advances have of recent years been made, due to introduction of new methods of research.

The free communications that exist between lymphatic vessels and between lymph-glands, and the many variations that occur, render it difficult to make absolutely accurate statements as to which glands, for instance, will become enlarged in a case of carcinoma in any given locality, and furthermore, from obstruction of lymph paths, as by thrombosis and change in direction of lymph currents, glands and areas that one would not expect to be affected may become so. However, a knowledge of the topography of the glands and the areas that they drain will be of much use to the operaor in his diagnostic and therapeutic efforts.

It appears remarkable that the extensive removal of lymph-glands — for example, those of the axilla, as is done for carcinoma of the breast — does not result in lymph stasis, when one considers that so many vessels are divided and the return of the lymph is seemingly impossible. The free anastomosis above referred to, and the ability of the lymphatics to empty themselves through other channels, probably account for this. At times, however, serious consequences follow the removal of glands, as witness the œdema and elephantiasis of the external genitals that occasionally come on after bilateral extirpation of the inguinal glands. As Bayer pointed out, when the surrounding fat, in which these glands are always imbedded, is also dissected away, and when inflammation, particularly of an erysipelatous nature, follows the operation, œdema and elephantiasis are more apt to ensue. This is accounted for by the obliteration of lymph-channels by the septic process, and the inability of the vessels and glands to regenerate, owing to the removal of the fat, for Bayer has shown that this regeneration is affected in the loose connective and fatty tissue.

The writer has seen temporary lymph stasis and œdema of the vulva develop after the radical operation for femoral hernia, in which several lymph-glands were removed, and the lymphatics which traverse the femoral canal were no doubt damaged.

Concerning the lymphatics of the brain and their relations to the peripheral lymph-vessels, we possess little positive knowledge. Indeed, it is generally stated that there are no lymphatics in the brain, and Dr. C. H. Mayo suggests that the absence of these vessels here

accounts for the formation of cysts after hemorrhages, owing to the lack of absorption, and infectious processes cause but little fever or constitutional disturbance. The lungs, on the other hand, are rich in lymphatics, and fever is a constant accompaniment of pulmonary infections.

The source of the lymph has not as yet been satisfactorily determined by physiologists; at any rate, there is no universal agreement among them on this question. The explanation of certain forms of œdema cannot be satisfactorily given at present, owing to our deficient knowledge upon this subject.

The importance of the lymphatic system as a defense against various pathological processes has of recent years come to be recognized, and a consideration of the vast subject of immunity deals largely with the lymphatic system.

A broad survey of the subject of drainage in all its varied aspects involves a thorough comprehension of the anatomy and physiology of this system. In this connection, allusion may be made to the so-called stomata of the peritoneum; one still sees these supposed openings between the endothelial cells of the peritoneum referred to in text-books and journal articles. It has been shown, however, by competent histologists that these stomata in reality do not exist.

The necessity of a thorough examination of the areas drained by a group of lymph-glands must always be remembered. In cases of enlarged glands of the neck — a region which is so rich in these structures — it is apt to happen that infection atria or minute epitheliomas in the oral pharyngeal or laryngeal mucosa are overlooked; the importance of carious teeth as infection atria in tuberculosis of these glands is not sufficiently appreciated.

In secondary carcinoma of these glands, their radical extirpation is of course of extreme importance, when at all possible, and properly planned incisions, such as have been suggested by Kocher and by Stieda, laying bare the whole affected area are to be made; the glands, with their surrounding fat and intercommunicating channels, must then be removed *en masse*.

C. A. Hamann.

## OPERATION IN RELATION TO MENTAL DERANGEMENT

The task of the surgeon who is to operate in a case of threatened insanity is not altogether an enviable one. The question whether the shock of operation will hurl the patient over the border-line, or, especially in disease of the uterus and ovaries, whether interference with those organs will bring on insanity such as has been reported in similar cases, is of a good deal of concern to the surgeon. It may be said at once that such anxiety is usually groundless. In general, the fact is, that a useless operation may unsettle the reason; a really necessary one rarely, if ever. Only two forms of insanity come practically into consideration in this relation; cases of the manio-depressive group and those of dementia precox. Operation on the abdominal or pelvic viscera is vitally important in its relations with insanity of the manio-depressive type, for the reason that such insanity is often at least caused by visceral disease. Unsuccessful or unnecessary operation may cause manio-depressive insanity, and such insanity, when in existence before operation, may be cured, often is cured, by successful operative interference. It is important to know the limits within which such operations may be useful, and the symptoms amenable to palliation or cure. The insanities making up the manio-depressive group are those formerly called acute melancholia, simple melancholia, melancholia agitata, chronic melancholia, acute mania, recurrent mania, and

circular insanity; that is, mania and melancholia in alternation, with or without lucid intervals. The dependence of these states on visceral disease is of inherent probability, considering the visceral reactions in normal emotion. It receives powerful support from the ordinary observations of physicians and laymen, alike on emotion as a toxic and irritative phenomenon; it is conclusively proved in cases of mania and melancholia, by the results of medical and surgical treatment when efficient, and one might add when sufficient. The existence of depression or of elation in any degree, either with or without accompanying delusions and hallucinations, in a patient in whom a remediable visceral disease exists, is an indication that any operation necessary to the restoration of visceral health should by all means be performed. It is hardly necessary to point out the fact that neither mania nor melancholia is due to a diseased condition of one invariable viscus.

The nature of dementia precox is little understood. In regard to operation on patients who manifest its symptoms in greater or less degree, one can only say that a successful and needed operation may improve the patient's chances by increasing his resisting power, but that care should be exercised not to subject him to the shock of an operation without at least a more than corresponding benefit in view.

Paranœa and paresis are never caused by visceral disease, and operation is not contraindicated in these conditions.

It is undoubtedly true that many cases of insanity following operation are instances of accidental sequence, but many more are the result of the unremedied disease for which operation was undertaken. This is true especially in cases of ineffective uterine and ovarian operations, in which only a part of the existing abnormality of those organs is corrected. Instances of operation on one diseased organ with coexistence of an unsuspected, or at least an uncorrected, abnormality elsewhere is responsible for some post-operative insanities. In these latter instances, not the operation itself, but the lack of thoroughness, is responsible for the development of the ensuing madness. HENRY S. UPSON, M. D.

# TRANSACTIONS OF SOCIETIES

## AMERICAN GYNECOLOGICAL SOCIETY

PROCEEDINGS OF THE THIRTY-FIRST ANNUAL MEETING, HELD AT THE HOMESTEAD HOTEL, HOT SPRINGS, VIRGINIA, MAY 22, 23, 24, 1906

The Association met at the Club House of the Homestead Hotel, and was called to order at 11 A.M. by the President, DR. RICHARD B. MAURY, of Memphis, Tennessee.

Addresses of welcome were delivered by DR. GUY HINSDALE of Hot Springs, Virginia, and DR. A. H. BUCKMASTER of Charlottesville, Virginia.

### IS GYNECOLOGY DEAD? OR, GYNECOLOGY AGAINST OVERDONE AND MISAPPLIED SURGERY

DR. EUGENE C. GEHRUNG of St. Louis, Missouri, said that surgery had done its very best to exterminate gynecology, in which effort it had nearly succeeded. Meanwhile, gynecology had been worked up to a higher standard, and had given unmistakable evidence that many cases could be cured by its means, even where surgery had failed to cure or even to improve. The differential diagnosis between surgical and gynecological cases should be carefully studied, and the cases divided, according to their merit, between the two specialties. Surgery and gynecology should work hand in hand, and the wrongful practices eliminated from both, otherwise much harm would ensue to the good name of the profession, in the present era, and to the welfare of humanity.

DR. GEORGE M. EDEBOHLS of New York City stated that his views relative to anteversion and anteflexion of the uterus had undergone radical changes since he began to practice gynecology. Whenever he found, on examination, that the uterus was anteverted or anteflexed, it led him to suspect that he had to deal with a case of excessive mobility of the uterus. In other words, it was the therapeutic equivalent of retroversion of the uterus, and the case was treated like one of retroversion where the uterus was flexible, or unattached, by shortening the round ligaments, and by so doing his efforts were usually crowned with success. Shortening of the round ligaments would cure cases of anteversion. This fact had been long known, but the explanation of it came only with time and increased experience.

DR. J. RIDDLE GOFFE of New York City said he had maintained for years that anteversion was a normal position of the uterus, and that it was taught by him that anteversion should be stricken out of the list of pathological positions of the fundus of the uterus. He had been doing this for a number of years, and did not find in later years any occasion whatever to interfere with a fundus that lay well to the front. The symptoms of which many patients complain could be accounted for by other conditions than that of the position of the fundus, and he invariably found some pathological condition to account for the symptoms. He did not try to manipulate the fundus in any way with a view to fixing it, nor interfere with its mobility.

With regard to anteflexion, it was regarded by him in a different light, and the belief was expressed that the anteflexed uterus was, as a rule, unless the flexion was acquired, an undeveloped uterus, and he treated it by improving its nutrition, by stimulating its circulation and developing the organ. If the case was one of acquired anteflexion, he treated it very much in the same way, but did not interfere with it surgically by shortening its ligaments, or by attaching the fundus to abnormal tissue.

DR. RICHARD R. SMITH of Grand Rapids, Michigan, read a paper entitled ENTEROPTOSIS, WITH SPECIAL REFERENCE TO INTRA-ABDOMINAL PRESSURE, BODY FORM, AND THE POSITION OF THE STOMACH AND INTESTINES. (See paper, p. 130.)

### DISCUSSION

DR. CHARLES P. NOBLE of Philadelphia, Pennsylvania, in opening the discussion on this paper, laid stress on the point that it was a mistake to teach that all patients who had loose kidneys had enteroptosis, as it was only in a minority of cases that a loose kidney was complicated with enteroptosis. It was true, however, that many patients who had enteroptosis had loose kidneys also. But the converse, in his judgment, was not true, for the reason that he had seen a few cases of loose kidney which were due to traumatism, but the number was very small. The great majority of women

who had loose kidneys were unmarried; therefore the question of child-bearing was a very small factor in these subjects. It had much more to do with enteroptosis by causing a flaccid condition of the abdominal muscles, but so far as the kidney was concerned, it was a small factor. His experience was not large in dealing with these cases in a surgical way, but he had operated on a number of them. He mentioned an operation devised by Dr. Beyea of Philadelphia, supplemented by a method recommended by another surgeon, which satisfactorily took care of these cases of dropped stomach. He recalled three cases upon which he had operated, followed by satisfactory results.

Dr. Matthew D. Mann of Buffalo, New York, said there were causes which had not been referred to, but which were very important. One of these was dress. The all-pervading style among civilized women of constricting the waist-line was an important causal factor. The universality of this mode of dress had a great deal to do with the condition mentioned, as it was more commonly found in women than in men. Of course, men who wore tight belts, like blacksmiths, and men who constricted their waists with bands, were the subjects of enteroptosis. As to women, however, it could be easily demonstrated that they had very little movement at the waist-line, not more, perhaps, than a quarter of an inch. This constriction interfered materially with the physical development of women.

With reference to the wearing of corsets, he said that he had seen corsets put on girls four and five years of age, and particularly on girls of twelve and fourteen years of age. When corsets were worn at this age, the thorax could never be of the proper shape, inasmuch as the abdominal muscles lacked supportive power, and the contents of the abdomen would be forced down into an abnormal position. Operative procedures for the relief of these conditions had not been satisfactory, and he did not believe we were in a position to treat surgically this condition, which was the cause of so much discomfort.

Dr. John G. Clark of Philadelphia said that in the last three or four years he had devoted considerable attention to the study of these cases. He had had 21 cases of various ptoses of the viscera, chief among which had been ptosis of the transverse colon, especially of the sigmoid flexure. He recalled several cases of ptosis of the sigmoid flexure, where a loop of bowel had been caught, in which there were alternating constipation and diarrhœa, the patient going three, or four, or five days before the bowels would move, and then possibly there would be a copious diarrhœa.

Dr. Clark outlined a method which he had practised for the relief of this condition.

As to the ætiology, his own belief was that in many of these cases inattention to the bowels was a material factor.

Dr. J. Riddle Goffe asked what percentage of these cases came to operation, to which Dr. Clark replied, a very small percentage, as medical men succeeded in relieving a great majority of them.

Dr. J. Clifton Edgar of New York directed attention to the too early getting up of women after confinement as a causal factor of enteroptoses. He said that women, when they got up too early after confinement, complained of stomach trouble, and drifted into the hands of stomach specialists, who would find dropping of the stomach or intestines, yet the women had not complained before. Such women were prone to attribute their discomforts to uterine trouble, to uterine displacements, etc. Constipation, alternating with relaxation of the bowels, produced by the constant administration of cathartics given during pregnancy, was doubtless one of many causal factors. There was a faulty involution of the intestinal supports. Involution of the abdomen, so to speak, should be complete before a woman got up after confinement. Time was necessary for this to take place.

There were many factors connected with prophylaxis. Massage was a valuable adjunct. Personally, he believed in women wearing abdominal support for three months after confinement, especially primiparæ.

Dr. J. Riddle Goffe of New York spoke of the corset as a part of woman's dress, and said he believed the new-fashioned straight-front corset was an improvement over those previously worn. He thought it was a garment beneficial to women. Instead of using abdominal support, as was formerly his custom after laparotomy, he put the woman in a straight-front corset, which was carefully made by a woman who carried out his idea. This corset supported the abdomen admirably. Women liked it very much, and some of them continued to wear it for years. He had also recommended this corset to be worn by women with pendulous abdomens. He reported two cases of gastroptosis which were relieved by operative measures.

Dr. Smith, in closing, pointed out the fact that a tight corset would exaggerate such conditions as he had referred to, but it must be borne in mind that enteroptosis was not due to the wearing of a tight corset, nor to tight-lacing, for this condition was quite common in Arabian women.

Dr. A. H. Buckmaster of Charlottesville, Virginia, read a paper entitled Anomphalosis.

Dr. Joseph Taber Johnson of Washington, D. C., read a paper on Thrombosis and Embolism Following Abdominal Operations. (See paper, p. 110.)

Dr. Eugene Boise of Grand Rapids, Michigan, followed with a paper entitled Post-operative Embolism. (See paper, p. 146.)

DISCUSSION

Dr. Charles P. Noble of Philadelphia called attention to some points made in a paper read last year before the society, by Dr. Baldy, on fibroid tumors of the uterus. He quoted Dr. Baldy as follows: "I have recently gone over the books of the Gynecean Hospital from the opening of the institution eighteen years ago, and find there have been nineteen patients to whom sudden attacks as of a stroke of lightning have come, all but two of whom have died. These cases occurred in the work of four different surgeons — Drs. Baldy, Penrose, Erck, and Beyea. The attacks, with two exceptions, have occurred after operation, and at a time when the patients were considered convalescent and wholly safe. One case died before operation, the second one four hours afterwards. The other seventeen cases occurred as follows: One on the second day, lived twelve hours; two on the third day, one lived twelve hours, one recovered; three on the fourth day, one lived two hours, one twelve hours, one forty-eight hours; two on the fifth day, one lived two hours, one forty-eight hours; two on the sixth day, one lived fifteen minutes, one forty-eight hours; four on the twelfth day, one recovered, one immediate death, two lived fifteen minutes; one on the eighteenth day, lived three days; one on the thirtieth day, immediate death; one on the thirty-fifth day, lived two hours.

"These attacks occurred without warning or apparent cause in any case; one patient was stricken while laughing and joking with other patients, and was dead almost as soon as a nurse could reach her. Another patient was aroused suddenly in the night from a sound sleep, sat up in bed, gasped, and dropped over dead. I had another patient, from the Policlinic Hospital, who had been home for two weeks; while talking and laughing with friends, she sat down on the bed, fell over, and died before help could be summoned.

"Diagnosis was made in 13 cases of heart, 4 cases of lung, 2 cases of cerebral apoplexy. In one of the heart cases the attack lasted only 24 hours, the patient recovering; one of the lung cases lasted for weeks, slowly recovering.

"During the period considered there were admitted for operation to the house 3,413 patients. There were, in all, 366 cases of fibroid disease. Thirteen of the 19 sudden attacks occurred amongst the fibroid class, or 3.55 per cent of the total. Six sudden deaths, only, occurred among the 3,047 remaining promiscuous class, or 0.10 of 1 per cent."

The speaker said that of 7,130 women operated on in the Johns Hopkins Hospital, in 48 phlebitis occurred. As to the character of the operations, it occurred after perineorrhaphy, 4 times; after myomectomy, 19 times; after the removal of ovarian cystoma, 9 times; after hysterectomy for carcinoma, 5 times; after suspension of the uterus, 3 times; after suspensio-uteri and perineorrhaphy, 4 times; after hysterectomy for pelvic inflammatory disease, once, and miscellaneous, three times. He had had embolism and phlebitis of the left crural vein twice after right nephrorrhaphies. He had had these conditions after hysterorrhaphy and after operations on the cervix and perineum. One of the worst cases he had ever seen was after hysterorrhaphy. He did not think sepsis had much to do with the question. Of all hysterectomies for pelvic inflammatory disease, there was but one case.

As the result of his study of the subject, he had come to the conclusion that most of our knowledge had yet to be learned.

Dr. Reuben Peterson of Ann Arbor, Michigan, said this subject was interesting to all surgeons. The mystery connected with the ætiology made it doubly interesting. No matter what the nature of the operation was, we could not absolutely promise a cure. This point had been emphasized by the essayist, Dr. Johnson, and the speaker's own experience bore out that statement. This condition came on not only immediately after operation, but also a month or six weeks afterwards. He was particularly interested in the subject because he had a patient in the University Hospital with an aggravated form of femoral thrombophlebitis, which appeared in the third week after operation. The operation consisted in the removal of non-adherent, non-purulent appendages. There was not enough sepsis connected with this case to warrant one in thinking that the woman would have any such condition develop. During the third week she developed thrombophlebitis of the left side, of a severe type, which extended not only to the femoral region, but also up over the buttocks. The swelling was very intense. Very soon a dark area appeared over the left femoral, and gradually this developed into a necrosis. A photograph was exhibited showing the area of necrosis referred to.

The speaker had taken statistics from his clinic for the last four and a half years, but these did not

include the case mentioned. Of 3,000 operations performed during these four and a half years at the University Hospital clinic, there were 6 cases of emoral thrombosis. There were 1,050 women operated on. Of these 6 cases, 3 came for the removal of the appendages, 1 for hysterectomy for fibroids, although there were 80 or 100 cases where fibroids were removed. One came for simple dilatation and curettement of the uterus. In one case the record was not available. The left femoral vein was affected four times, and in one case the left groin and the right leg were affected.

With regard to its occurrence after operation, in one case it took place eleven days after operation; in two cases it occurred fourteen days after operation; in two cases, nineteen days; and in one case, twenty-one days.

Dr. Edward Reynolds of Boston had observed, in his experience, that thrombosis occurred most frequently in cases treated for the correction of retrodeviation of the uterus in which there had been a great deal of congestion before the operation. He was strongly inclined to believe that we were falling into the error of underestimating the importance of congestion in the production of symptoms. In these cases there was an approach to a varicose condition in the broad ligaments, and fifteen years ago we were taught, and believed, that this was an important element in the production of symptoms in pelvic disease. At that period cases were carefully prepared for operation by depletion. He was inclined to think that we were neglecting too much the treatment of congestion before operation, and were becoming too prone to operate on patients without previous preparation, and that we were getting thromboses from that cause.

Dr. Andrew F. Currier of New York said there was one point which he thought was overlooked by Dr. Johnson in his paper in regard to the development of thrombosis, and that was the tendency among certain surgeons at the present time to be in too much of a hurry to get patients up and round after the performance of serious operations. It seemed to him that such a procedure was extremely irrational and unphysiological, for, after the performance of a severe operation, we had a condition of shock, a condition of depleted vitality, if he might use that expression, which could only be repaired or restored by time, and for the sake of saving a few days, the argument was advanced by some surgeons that patients should be gotten out of bed and allowed to walk about or to go home a few days after operation. This was exposing patients to the risk of thrombosis, which was the subject of discussion.

He was impressed with a statement made by Dr. Edgar this morning in regard to want of involution of the muscles immediately after labor, which probably was a condition which obtained also to a greater or less extent after severe pelvic operations, and the same reasoning which would impel one to keep a parturient woman in bed for a reasonable length of time ought to obtain after these severe operations.

Notwithstanding all of the information which had been given in the papers and discussion by men of very large experience, he thought we were still in the dark as to the exact cause. He had had some cases in his own experience in which he was unable to ascertain the cause. Patients had undergone operations which caused no particular difficulty; their convalescence had gone on satisfactorily for a few days, and suddenly they died, and it was assumed death was from embolus, and if an autopsy was made, he thought no doubt pulmonary or cerebral hemorrhage would be found to be the cause of death. It was the duty of the profession to consider the point very seriously, that, after an operation, a patient should be given sufficient time for convalescence and for a return to the normal condition of the blood before he or she was permitted to get up and go about.

Dr. Seth C. Gordon of Portland, Maine, said the last speaker had stolen his thunder. He agreed with Dr. Currier that a great many of these cases of thrombosis and embolism were due to the fact that women, shortly after confinement, were allowed to get up and sit on a vessel, etc., and while he had never seen a sudden death occur after labor, he believed this was one of the factors that tended to phlebitis. He mentioned two cases that had occurred in his own practice within the last two months, of phlebitis of the femoral vein, one in a comparatively young woman, after an operation for appendicitis. It did not come on in consequence of her sitting up, but came on two weeks afterwards. The other occurred in a man sixty-nine years of age, who was on a trip to Mexico, and on the first day of March he was taken with cerebral hemorrhage and shock, followed by paralysis of the left side. He got home after two or three weeks to Portland, and about eight weeks after the shock, or about the first of May, he was taken with a severe phlebitis of the left leg, and was just now recovering from it. This man had arteriosclerosis, and it was undoubtedly one of those cases where the defect or fault was in the vein itself. Whether or not it may have been aggravated by the massage that had been given him, he did not know. He believed that phlebitis after labor might be due in a great many instances, especially

in women who were advanced in life, to allowing them too much liberty.

Dr. T. J. Watkins of Chicago said there was consolation in the possibility that these cases of thrombosis might be non-septic; but the evidence was much in favor that they were due to infection. They were largely common in infectious diseases where there was no history of traumatism. They were common after typhoid fever. We did not get cases of thrombosis in non-infectious diseases. We did not get these cases in traumatism of the vessels from abdominal contusions. We might get very extensive traumatisms of the veins in cases of fractures or in cases of contusions, but we did not get cases of thrombosis in these patients. Where there was thrombosis, we did not get the septic symptoms that accompanied the post-puerperal cases of thrombosis. Again, it was said that these cases were possibly no infectious; that the non-inflammatory cases were more liable to this condition than the inflammatory septic cases. It was quite probable that the septic cases were more immune to thrombosis than the non-septic cases that were operated.

Dr. J. M. Baldy of Philadelphia stated that while sepsis, pressure by retractors, traumatism of the pelvic veins, were possible causal factors, yet none of the explanations so far offered were sufficiently feasible, in his judgment, to explain the large number of cases.

Dr. Le Roy Broun of New York narrated a case of complete thrombosis of the subclavian immediately following a supravaginal hysterectomy. The patient was thirty-five years of age; the operation was uncomplicated. She was put to bed in good condition. There was, however, a mitral regurgitant murmur, but no dilatation; nor was there any hypertrophy of the heart. As soon as the patient came from under the influence of the anæsthetic, she complained of pain in the right arm, and on examination it was found to be white. There was no pulse at the wrist, nor at the elbow, nor in the axilla. The patient, however, made an uninterrupted recovery.

Dr. John G. Clark of Philadelphia said that in discussing the subject of thrombophlebitis we should consider the pathology in general, rather than to attempt to follow any given cause as the cause of this class of cases. Blood dyscrasia applied to a certain group of cases. In considering a large series of cases on a previous occasion, which he subsequently treated, he found that they did not belong to any given class of cases. In other words, cases of simple suspension of the uterus were frequent, ovarian cysts were frequent, and fibroids were most frequent of all. There was a large class of cases who were not bleeders.

He agreed with the previous speakers that sepsis cut practically no figure in the majority of cases.

Professor Dr. M. Dührssen of Berlin, Germany, believed that in most cases of embolism there was blood dyscrasia. He did not think these cases of embolism had anything to do with sepsis. He had seen some cases of embolism following hysterectomy for fibroids. The patients were very anæmic, very weak, but they made good recoveries. They had no fever. He recalled one case in which there was great mental excitement in an anæmic woman, and when she raised herself in bed on the seventeenth day after hysterectomy, she fell back dead.

Dr. George M. Edebohls of New York City had looked up his cases of thrombosis following operative work, and they had been ten in number since 1890. The first point he wanted to make was, that they did not necessarily attend operations upon the pelvic viscera or external genitalia. Dr. Noble had already emphasized that point, and had said that he had had two cases following nephropexy. The speaker had had two cases following right nephropexy, where the operation was completely aseptic, and thrombosis of the femoral vein occurred on the opposite side. Of his ten cases, nine were on the left and only one on the right side. In addition to that, of the ten cases, none was septic. There was no sepsis at the time he operated. They were clean cases, with primary healing of the wounds.

Dr. Richard R. Smith of Grand Rapids, Michigan, reported a case of thrombosis of the left leg following an operation for appendicitis. The man was operated on the fifth day; there was primary healing of the wound, and no pus at the time of operation. However, patient had a stormy convalescence; he became very weak; cardiac action became rapid, and he went along for two weeks, then suddenly developed thrombosis. The man recovered, with loss of the leg from above the knee. Examination of the heart was made daily before the occurrence of the accident, as well as afterwards, without finding anything which would give any clew.

Dr. Richard C. Norris of Philadelphia said there were undoubtedly many factors in the production of this complication, and that each individual's experience must necessarily be rather limited. He called attention to a case of thrombosis of the left leg following an Alexander operation, the only one he had ever heard of. In this case, on the left side, there was some difficulty in finding the round ligament, and the retractor was used more

frequently than was customary in this operation.

As bearing upon traumatism as an ætiological factor, he called attention to two or three cases he had observed of thrombosis in the abdominal wall, which he believed followed the Crédé method of manipulation, and he believed that if obstetricians were to observe the abdominal walls of their patients they would frequently find that the application of the abdominal binder and pad covering up this area of the body for a long period would induce such a condition and the cause be overlooked.

Dr. Henry P. Newman of Chicago said we should consider the susceptibility of the patient to trauma, and the relative terms "infection" and "non-infection." The question arose, Could we do any operative work without some bacterial invasion? Could we say there was no infection in these cases? He cited his own case, in which phlebitis occurred following an operation for appendicitis, although the surgical work was well done. He thought his impaired health at the time was against him, and the result was a severe phlebitis following operation, which lasted for a year and a half. He referred to his own case to reconcile, if possible, the apparently diverging ideas with reference to the cause of these troubles. Susceptibility of the patient to these various influences or causes and trauma were causative factors, and the presence of bacteria might do much mischief in certain conditions.

Dr. Johnson, in closing the discussion on his part, said he thought the point made by Dr. Currier was a good one, about patient being allowed to get up very soon after operations. About a month ago, while in New York, he was asked by Dr. Boldt to see him operate for the removal of a fibroid tumor of the uterus. Dr. Boldt told him that he expected to have the patient up the next day. This nearly took away his breath. Dr. Boldt informed him that this was his custom. Dr. Johnson told him that he was writing a paper on "Thrombosis and Embolism Following Abdominal Operations," and was looking up the causes for the occurrence of these conditions. He told Dr. Boldt that he thought a good many of them were caused by the too early getting up of patients or too much moving around. Dr. Boldt said that he had been getting his patients up, nearly all of them, within a week after operation, and many of them within three or four days, some within two days, and yet he had never had a case of thrombosis occur in any of them. He thought this added another mystery to the subject.

Dr. Boise, in closing, said he was convinced that at present he did not know what the cause of thrombosis was. However, one could say from the discussion that it was not always due to sepsis. Sepsis might be an important factor in certain cases, but it did not enter into every case. We must conclude that there were several factors entering into the different cases of thrombosis; that we could not attribute all cases to any one factor or series of factors. He believed, however, that blood conditions were the most constant of all.

## Symposium on Dilatation versus Incision of the Pregnant Uterus

### (*a*) *Artificial Dilatation of the Cervix Uteri; Indications and Methods*

Dr. George Tucker Harrison of New York pointed out as indications for the artificial dilatation of the cervix, local morbid conditions which interfered to such an extent with the dilatability of the os uteri and cervix that the natural forces were inadequate to the end to be attained. In addition, direct danger to the mother and child might furnish an indication for the artificial dilatation of the cervix, a danger only to be offered by a speedy delivery of the child. Of the local diseases, he referred to those which made a rigid, unyielding condition of the cervix; namely, chronic inflammations, syphilitic induration, carcinoma or hypertrophy of the infra and supra vaginal portions. Of the pathological conditions which demand operative intervention, in the interests of both mother and child, to effect a speedy delivery, he mentioned eclampsia, prolapse of the umbilical cord, placenta prævia, portialis, asphyxia of the fœtus, and beginning sapræmic intoxication, consequent upon a dead fœtus or the retention of placental parts. Furthermore, the premature detachment of the placenta, attended by internal or external hemorrhage, was a grave and dangerous accident which demanded a prompt delivery. Artificial dilatation was indicated when in an obstetric operation (forceps, version, perforation) the passage of the head or breech met with difficulty in consequence of an insufficiently dilated os uteri. Finally, an indication was furnished in cases of transverse presentation with premature rupture of the membranes when version, according to the Braxton-Hicks method, was not yet possible, and also in certain cases of narrow pelves, with the head at the brim, in order to make the prophylactic version.

An indication for the incision of the os uteri was given when immediate delivery was a matter of paramount importance, the os uteri not being sufficiently dilated, the cervical canal, on the contrary, unfolded. The deep incisions of the cervix usually combined with deep vaginal and perineal

incisions opened up a wider field for operative intervention. The advantages of this procedure were pointed out.

Mechanical dilatation of the cervical canal and external os uteri could be effected by distention with the fœtal body after bringing down a foot; by the hand; by the use of expanding foreign bodies, such as thin dilators, iodoform-gauze, rubber bags, or balloons.

(*b*) *Dilatation of the Parturient Uterus*

Dr. Philander A. Harris of Paterson, New Jersey, read a paper on this subject. (See paper, p. 79.)

(*c*) *Advantages of Bimanual Dilatation of the Pregnant and Parturient Uterus*

Dr. J. Clifton Edgar of New York said that, clinically, he was accustomed to divide all cases calling for rapid delivery into: 1. Those in which the supravaginal cervix was dilated and drawn up into the lower uterine segment, the defective dilatation being confined mostly to the external os; and 2. Those in which the cervix was rigid, and no preliminary dilatation had taken place.

In the first instance he could hardly conceive of a condition calling for incision of the uterus for purposes of dilatation, as skillful bimanual stretching would fulfill every requirement.

The most difficult cases for artificial dilatation were those in which the cervix was rigid and no preliminary dilatation had begun.

Previous to the introduction of the Bossi type of metal dilator, he incised a number of these cervices by both superficial and deep incisions. Since its introduction, however, he had cut very few cervices. He considered the Bossi dilator a valuable addition to our resources, and its use justifiable.

His experience had taught him, however, to reject the Bossi dilator as a means to complete dilatation. The instrument and its modifications were not shaped for the dilating cervix, the end of the blades could not be controlled, and he had seen serious lacerations result from the use of the instrument in the last stages of dilatation. Theoretically, the dilating part of the instrument remained applied to the ring of the cervix; clinically, it was apt to slip off the rim of the cervix and injure the uterine wall above and the vaginal below. Zweifel had observed four serious lacerations and one complete uterine rupture from its use.

An important advantage of manual dilatation of the uterus was that it at the same time dilates the vagina in preparation for the subsequent passage of the fœtus. This could not be said of vaginal Cæsarean section or of incision of the cervix. Vaginal Cæsarean section, while it certainly was a competitor with mechanical dilatation in certain cases, must be used with care, and was only applicable in a relatively small proportion of cases.

Much had been said of the danger of extensive laceration involved in the operation of mechanical effacement of the cervix. He had in his fifteen years' experience with bimanual dilatation one complete rupture of the uterus, in a case of placenta prævia. His records showed that in no more than three cases was it deemed necessary to suture the cervix subsequent to the dilatation.

Vaginal Cæsarean section was still in its infancy, and although in the cases reported few complications were cited, still, if the cases were not properly selected, serious outcomes were sure to result.

The author cited a case to illustrate his method of procedure.

In his sixteen years' experience in five maternity hospitals, he had not met an interne who, after having tried the two methods of cervical dilatation, namely, with one and with two hands, did not finally adopt the method requiring the use of the fingers of both hands, and for the following reasons:

1. The bimanual method is a closer imitation of the natural process than any other method of manual dilatation, but in this respect is analogous to the bag of membranes or the hydrostatic bag, because the force used in dilating the cervical ring is directed from above downward.

2. Far greater force can be brought to bear upon the cervical ring, if need be, by the bimanual method than by any other, because the fingers of both hands are brought into place and the stronger flexor muscles of the fingers and hands are the ones made use of.

3. There is no danger of prematurely rupturing the membranes, as there is when the fingers of one hand are passed through the cervix.

4. There is no interference with the original presentation or position, since the finger ends closely hug the lateral uterine wall. This cannot be said of any other manual method of dilatation, not even by that of the hydrostatic bag.

5. The bimanual method is far less fatiguing than any other method, because the strain is distributed in both hands, and the sense of touch of the operator's fingers is unimpaired, as there is no constriction of the hands, as there is when one hand is used.

6. The amount of force exerted can be better estimated with two than with one hand; hence the danger of laceration is lessened.

7. In placenta prævia there is less separation of the placenta with the manual method than when the fingers of one hand are thrust through the ring of the os.

8. The bimanual method can be performed while a part of the fœtus, as a leg or an after-coming head, already occupies the vagina. This advantage applies to no other method of manual dilatation, and is, in my opinion, its greatest recommendation."

(*d*) *Dilatation Versus Incision of the Gravid Uterus*

Dr. Egbert H. Grandin of New York contributed a paper on this subject, which was read by title. He said the subject must be considered from the standpoint of the elective operation as well as from the viewpoint of the emergency operation. Incision should never be resorted to when the complication calling for intervention justified delay. Thus in induction of labor in a case of pelvic contraction, interference in many cases of impending toxæmia, as also in most instances of placenta prævia, calling for dilatation. On the other hand, the acute toxæmias, the urgent instances of placenta prævia, called for incision. The operative methods to be considered were abdominal and vaginal incision, and manual and instrumental dilatation. Broadly speaking, in pelvic contraction, whenever it was doubtful that dilatation or vaginal incision would permit of delivery, abdominal incision was called for. In the acute toxæmia, where the time element entered as a factor, and in rare acute cases of placenta prævia, vaginal incision was justifiable, else dilatation should be the rule after a prescribed technique.

Such devices as the Bossi dilator should receive the unqualified condemnation of American obstetricians. They were needless where the educated hand existed; they were dangerous under any condition. In the event of incision being indicated, the vaginal Cæsarean section was to be commended as preferable to the Dührssen incisions. The indication for either was extremely limited.

Professor Dr. M. Dührssen of Berlin, Germany, read a paper on Vaginal Cæsarean Section. (See paper, p. 74.)

ON THE POSSIBILITY OF THE DEVELOPMENT OF CANCER IN THE CERVICAL STUMP FOLLOWING SUPRAVAGINAL HYSTERECTOMY

Dr. Andrew F. Currier of New York said that the reason there had been so few reports of cancerous degeneration in the cervical stump which remained after the removal of the corpus uteri by abdominal section, was due, in part at least, to the fact that the great majority of these cases were not heard from after they left the hands of those by whom the primary operation was performed.

The cases in which this complication might arise were usually those in which the uterus had been removed for myoma. That myoma frequently coexisted with cancer was a matter of common observation.

Piquand had collected 45 such cases, in 24 of which it was thought that the fibromuscular elements had been transformed into epithelial cells, although in some of them there were coexisting cells which proliferated and developed maligancy. These cells were supposed to have been derived either from the embryonic remains of the Wolffian or Müllerian canal, or were simply epithelial ingrowths into the fibrous tissue.

The author was satisfied from his own experience that the coexistence of cancer and myoma was much more frequent than Piquand would seem to think. Noble, for instance, in an analysis of 1,188 cases of fibroid tumors, operated upon by various surgeons, found 29 in which cancer of the corpus uteri was a complication, 12 in which there was cancer of the cervix, and 1 in which there was cancerous infiltration of the fibroid tumor arising from adenocarcinoma of the corpus uteri by metaplasia. He believed the records of any institution in which large numbers of cases of cancer were seen would show a much greater number of coincidences of cancer and myoma than the statistics of Noble would indicate and that the number associated with cancer of the cervix was much greater than with cancer of the body of the uterus.

He had not yet seen any conclusive evidence that myoma was transformed into carcinoma, and histologically one would not expect such a sequence.

Of the cases appearing in the literature, the author added one which recently came under his observation. The patient was 51 years old, and was sent to him October 5, 1905. The corpus uteri, ovaries, and tubes had been removed for uterine myomata, March 23, 1905, by the late Dr. George R. Fowler of Brooklyn. The patient recovered promptly from the operation, but subsequently developed carcinoma of the left breast, and this was removed by the same surgeon eighteen months after the first operation. Recovery from the second operation was also prompt, although the woman had complained of pain and numbness in her side and arm ever since.

Dr. Currier dissected out the cervix from the vagina November 15, 1905, which was found well covered with thickened and firmly adherent peritoneum. The mucous membrane of the os uteri showed typical epithelioma, which had not proliferated to the surrounding structures, nor had

the tissues broken down. The patient recovered promptly.

The suggestions which occurred to him in connection with the consideration of this subject were the following: 1. The necessity of more careful clinical and pathological records, both public and private, in all the cases in which supravaginal hysterectomy is performed. This would probably result in the discovery of cancer of the endometrium in cases in which it is not suspected, and would probably bring to light additional facts in regard to the history of the evolution of cancer. 2. The periodical examination of those who have undergone the operation in question at not longer than six-month intervals. This is especially desirable in those whose tissues are in a bad condition of nutrition, or who suffer from an hereditary taint. 3. Complete removal of the uterus offers greater security from cancer than the retention of the cervix. If the patient's history reveals any conditions which suggest the possibility, near or remote, of future degeneration of the tissues, complete extirpation should be the invariable rule.

DISCUSSION ON DR. CURRIER'S PAPER

Dr. Henry Newman of Chicago showed a specimen and slides of a carcinoma which developed seven years after an operation for extirpation of the uterus for multiple fibroids. The carcinoma developed in the stump of the cervix, but the disease had not advanced beyond the area of the stump. It was of a very malignant type, as shown by the pathological report. He said that this case had changed his idea of what ought to be done, even in apparently normal conditions of the cervix. It was easy to extend one's operative work from a simple hysterectomy to a panhysterectomy.

Dr. Charles P. Noble of Philadelphia recalled two cases of cancer of the cervix following supravaginal amputation. Roughly speaking, of six hundred cases he had had three hundred cases of fibroids. One of these cases occurred a number of years ago, following the removal of a fibroid tumor. The cancerous condition had been overlooked.

He had been studying fibroid tumors for years, and said, in a recent paper by Winter, sixteen cases were reported of cancer of the cervix following supravaginal amputation. He thought this included all cases found in the literature. While the percentage of cases in which this disease occurred following operation was comparatively small, it was nevertheless worthy of consideration and reflection. It would not influence him to change his technique unless the future showed a very much larger percentage of cases of occurrence of cancer than was shown at the present time.

As to the primary mortality from supravaginal amputation, it was lower than that following total hysterectomy.

As to cancer arising from a fibroid tumor, some years ago he removed what he considered a degenerated fibroid tumor from a maiden lady of sixty, and to his surprise the pathologist reported that it was an epithelioma. This pathologist was present at the operation. He cut the tumor open to see whether the woman had cancer of the corpus, and when the pathological report came that it was an epithelioma, he was at a loss to understand the matter, because the woman had an apparently healthy cervix. After prolonged study by Drs. Pierce and Cullen, the conclusion was reached that the woman had a small adenocarcinoma that had been overlooked, which had invaded the fibroid, and by metaplasia the cells had taken on the appearance of squamous cell epithelioma. Piquand had studied this matter carefully, and had found a number of cases of cancer after fibroid tumors. The probabilities were, that, after further study, it would be found that all of the cases of cancer arising directly from fibroids were cases of adenomyomata, and not of myomata. At the present time he had a series of five thousand cases of fibroid tumors to study the relation of cancer to myoma, and said the evidence was overwhelming that the presence of fibroid tumors of the uterus led to cancer.

Dr. Walter P. Manton of Detroit operated on a woman, 45 years of age, about three years ago, who had an immense fibroid tumor extending above the umbilicus. She had had repeated hemorrhages, and had been consulted by a number of physicians who had tried to relieve her by operative measures. The appearance of the fibroid was that of the ordinary growth. The woman made a good recovery from the primary operation. Three months later she telephoned him from a suburban town that she was having hemorrhage from the vagina, and he advised her to come and let him see what the trouble was. At the operation he left only a very small portion of the cervix, and the tissues were apparently perfectly normal. When she consulted him the second time, however, he found a large cauliflower growth projecting from the external os, very friable, which bled profusely on the slightest touch. He immediately removed the small stump, including the growth, and then had the original tumor examined. The pathologist found that the new development or tumor was a spindle-cell sarcoma. This was the

only case of the kind he had been able to find in the literature.

Dr. William M. Polk of New York said the question at issue was, Shall we or shall we not remove the cervix in cases of hysterectomy? He should say that we knew very little about it, except for the light which had been thrown on the subject to-day. The members had been theorizing on this subject since a similar discussion occurred in the society some twenty years ago, when Dr. Baer brought up the question of this form of removal of the uterus. The point in favor of leaving the cervix had been well brought out, and while undoubtedly there was reason to believe that tissues such as the cervix were likely to undergo malignant degeneration wherever there was epithelial structure, it was not a matter of great surprise if one met with this form of disorder. The question as to whether the disease could be detected at the time of the original operation or not seemed to have been met by the report of the case narrated, in which five years elapsed between the operation and the development of the disease. He did not think we were in a position to decide the question, except on general principles, based upon the observations which had been presented. Arguing from analogy, one would infer that a curtailment of the source of nerve and blood supply to the cervix would have a tendency to diminish rather than increase the disposition toward malignant degeneration.

Dr. Fernand Henrotin of Chicago said that the operation of supravaginal amputation was so ideal, and had produced such beautiful results, and had been taken up by such a large number of the profession, that everything bearing on the removal of the cervix should be regarded in the proper light, and he suggested that all cases of this kind reported in the future should be carefully investigated, to make sure that the diagnosis of carcinoma was made both by clinical and pathological findings. There was no question but that after supravaginal amputations, operators left more or less of the stump of the cervix. Some left more than others. He thought probably it was the habit of many operators, like himself, to leave quite a bit of tissue above the mere cervix to be reconstructed and covered up by peritoneum. It sometimes happened that hemorrhage occurred from the portion of cervix that was left. Many had undoubtedly seen hemorrhages from the cervix after supravaginal amputation. He recalled two or three woman who claimed that they had menstruated for months and months afterwards, and there was no question, where the blood-supply was cut off, that there was a tendency to the formation of granulation tissue and the oozing of blood from the cervix.

Three years ago he operated on a woman for a suppurative lesion, and found the whole pelvis very much involved. He removed both ovaries and tubes, and did a hysterectomy. Two years later the woman returned to him blanched by a severe hemorrhage. She had granulation tissue and an excavated cervix. He was certain that this was a case of carcinoma of the cervix. Accordingly, he operated per vaginam, and removed the cervical stump as completely as he could, and she had been well since. Much to his surprise, although it had the ear-marks and physical signs of carcinoma, examination of the cervix and of the tissue around it by the pathologist proved the condition to be one simply of granulating, bleeding stump, which came from inside the cervix, and had pushed out the granulations through the cervix, and was non-malignant.

In coming to a conclusion from small hemorrhages from the cervix after supravaginal amputation, he said we should be careful to insist upon proof of the malignancy of the condition found.

Professor Dr. M. Dührssen of Berlin, Germany, by invitation, said that cancer of the cervix could arise from a portion of the cervix that was left after supravaginal hysterectomy. The fact that this could occur spoke in favor, in his judgment, of vaginal hysterectomy in cases of fibroids of the uterus, because in the extirpation of these tumors by the vaginal route the cervix could be removed without any difficulty. In all the cases he had seen operated in America for fibroid tumors of the uterus, he believed it would have been possible and much easier to have removed the myomatous uterus through the vagina. It was possible to take out a large myomatous uterus through the vagina with the aid of the vaginoperineal incision — incision of the levator ani muscle. In one case upon which he operated at the Policlinic in New York, the myomatous uterus was as large as a man's head. The patient was an old woman with a narrow vagina. He split the vagina with this incision, and removed a large myomatous uterus without difficulty.

Dr. Currier, in closing, was impressed with the narration of the case by Dr. Noble, of the development of cancer in a virgin of sixty, within the body of the uterus as being quite suggestive, and he had a similar case to that only a few months ago, in a woman of 61, the supposition being that it was simply a case of fibroids or of myomata, but proved to be very extensive cancerous development. The growth was removed.

At this juncture, Dr. Howard A. Kelly took

the chair, and PRESIDENT MAURY delivered his address. He selected for his subject THE SEARCH AFTER TRUTH. (See paper, p. 69.)

On motion of DR. T. A. REAMY of Cincinnati, a vote of thanks was extended to the President for his very judicial and masterly address.

DR. WILLIS E. FORD of Utica, New York, read a paper entitled RESULTS OF VAGINAL SECTION AND DRAINAGE IN EARLY CASES OF ECTOPIC GESTATION. (See paper, p. 116.)

DISCUSSION

DR. FERNAND HENROTIN of Chicago called attention to the great danger from excessive hemorrhage in cases of ectopic gestation, and said that we were not in a position to control it in the acute active cases. He thought the essayist referred in a rather indefinite way to the unruptured cases, and that he had not furnished unmistakable evidence that the cases were unruptured. The good results he obtained in the majority of them were doubtless due to the fact that the ovum was already dead, and that he had operated on hæmatocele in the broad ligament. In his opinion, it was not proper to operate upon an unruptured case by vaginal incision if one wanted to obtain a good result and the ovum was alive. When once the ovum was dead and the vessels blocked, one could operate with safety. The operation was then ideal. He had removed babies from very small size up to eight and nine months, when dead, through a vaginal incision.

DR. T. J. WATKINS of Chicago said that neglected cases of infected hæmatocele were ideal ones for incision and drainage. It was difficult to differentiate between some cases of tubal pregnancy and some cases of pelvic infection. We frequently saw cases in which the two conditions were associated, and in which it was very difficult, even after consulting the hospital records, eliciting a careful history, the findings, etc., to differentiate between the two without an abdominal section. In all cases of tubal pregnancy, save those of neglected infection and hæmatocele, abdominal section, with extirpation of the tube itself, was the ideal operation.

DR. I. S. STONE of Washington, D. C., thought the use of a large amount of gauze in any case to control hemorrhage was a confession of failure of surgery. He did not think any surgeon had the right to use gauze as a packing in these cases of extrauterine pregnancy to check hemorrhage when he could use a ligature or suture, or even the cautery. When one could reach any bleeding-point, either anterior or posterior to the fundus of the uterus, it seemed to him that this ought to be done, and the patient not allowed to return to bed bleeding from the gauze used in packing.

Relative to the pathology of extrauterine fœtation, in a number of instances it was known that the broad ligament did not contain the fœtus and membranes. It did not always contain hæmatoma. There were a number of cases of tubal abortion and hæmatoma forming after the rupture of the tube, behind the tube, in the pelvis. One did not know whether he had a rupture to deal with in the broad ligament or not before operation, and very often even with the cul-de-sac open. Therefore, if one attempted to pack a large amount of gauze into a sac merely containing an adventitious covering instead of the broad ligament, it was an unwise thing to do.

DR. MATTHEW D. MANN of Buffalo, New York, did not believe in operating these cases, as a rule, through the vagina, where the fœtus was alive, and there might be an exception to that occasionally. His first experience in this line was disastrous. He reported a case to the society a number of years ago, where he operated through the vagina, following a paper read by one of the members, which gave him the idea it was a good thing to do. A profuse hemorrhage followed. He packed the vagina, and left the patient in a good condition. After he left the hospital she had another hemorrhage; the house surgeon packed once, but the woman died. He thought if he had been called immediately in this case, and had opened the abdomen, her life might have been saved. Since then he had been opposed to operating vaginally in cases of infected hæmatocele.

DR. SETH C. GORDON of Portland, Maine, thought the first rule of surgery was to save life. Several years ago he heard Lawson Tait make a statement at a meeting of the British Medical Association, to the effect that no man ever made a diagnosis of extrauterine pregnancy before rupture. In many cases the diagnosis of extrauterine pregnancy had been made before rupture had taken place. He believed that he made the second successful operation for extrauterine pregnancy in America. In this case the diagnosis was made by a former student of his twenty-four hours before operation was undertaken. He did not think, when a diagnosis of extrauterine pregnancy was made, that one should attempt its removal through the vagina, as he did not believe it was possible for any surgeon to do as good work through the vagina in these cases as it was by opening the abdomen. In the first place, one had an exceedingly sensitive tube to deal with; it was almost ready to rupture, and one could not do this

work as well through the vagina as through the abdomen. The society should not go on record that vaginal work was to be done regardless of what the conditions might be. It was not safe surgery, which was the only groundwork for good surgery.

DR. J. RIDDLE GOFFE of New York City thought the condemnation of vaginal work was due entirely to the fact that when men spoke of operating by this route they meant simply an opening in the Douglas pouch. If this were true, it was condemning the vaginal route in an altogether too narrow limit. In his experience, there was no method of approach so direct, so complete, so simple, as the vaginal route in cases of ectopic gestation. When he spoke of the vaginal route he meant an opening through the anterior vaginal fornix. If one made an opening simply in the Douglas pouch, he must depend upon the consistency of the tube to drag it down to get it where he could apply a ligature, and this was often a dangerous and desperate piece of work. On the other hand, when one opened through the anterior vaginal fornix, he had everything under his eye and was following the most direct route possible to reach the conditions to be dealt with.

DR. CHARLES P. NOBLE of Philadelphia said the way to deal with septic hæmatocele was by incision through the posterior fornix. His experience, however, had been that in half of the cases so treated, subsequently he had to do an abdominal section to remove the diseased tubes. Therefore, while this was the safest way to deal with tubes, it did not cure the patients in more than fifty per cent of the cases. Recently, he had an experience in operating through the vagina, which, if his convictions were not already formed, would have influenced him. He supposed he had an inflammatory case to deal with. He opened the posterior fornix, and before he could get the abdomen opened and the bleeding stopped, the hemorrhage was so excessive that the woman died.

With reference to how to deal with the ruptured cases, he had operated on about a hundred such cases altogether, and his experience with this type of cases operated on by abdominal section had been that there was one death in somewhere between eighty and ninety cases. This woman had consumption and Bright's disease. She died of acute uræmia.

DR. HENRY P. NEWMAN of Chicago said, with reference to operation for ruptured tubal pregnancy, there should be a distinction made between hæmatoma and hæmatocele. Bleeding into the free peritoneal cavity was one thing, and hemorrhage from the broad ligament or hæmatoma was another. He agreed with those who condemned operating through the vagina when the fœtus was alive. He would make that as one of the exceptions to the operation, where the hemorrhage occurred into the broad ligament, the hæmatoma not occurring frequently, but occasionally a case could be attacked with safety through the vagina.

DR. PHILANDER A. HARRIS of Paterson, New Jersey, said we should not attempt to pass quick judgment on anything unless we understood it, and he hoped Dr. Ford would state whether the cases were operated on by an anterior or a posterior incision; also, in what proportion of cases hæmostasis was effected in a satisfactory surgical manner, and if he relied for hæmostasis on packing gauze into the rather loosely walled hæmatocele sac, etc.

DR. FORD, in closing the discussion, said he related one case of infected hæmatocele for the purpose of showing what it was possible to do after hemorrhage had taken place. He had no idea that the members would interpret his paper as favoring doing these operations through the vagina in all cases. He thought it was a safe thing to do in a case of infected hæmatocele. He got his first hemorrhage from a ruptured case in 1897, when he was beginning to do vaginal work.

As to the twelve cases narrated in the paper, he did not know in every case that they were instances of ectopic pregnancy. He thought it was a good thing not to remove his finger from the opening in the sac until he knew whether there was any blood in the sac or not. In fact, he never took his finger out of the smallest opening in the sac until he knew whether blood was present or not. He left his finger in the opening in the sac until he applied a piece of gauze firmly against the opening to control hemorrhage. He believed it was more risky to attack these hemorrhagic cases through the vagina than through the abdomen. If the general practitioner brought cases of small swellings with an occasional history of ectopic gestation to the operator before he (the general practitioner) was able to make an accurate diagnosis of that condition, vaginal incision, if resorted to before rupture took place, would in a few cases give very good results.

SYMPOSIUM ON IMMEDIATE AND REMOTE RESULTS OF SO-CALLED CONSERVATIVE OPERATIONS ON THE UTERINE APPENDAGES, OVARIES, TUBES

*(a) A Review of Surgery of the Female Pelvic Organs*

DR. SETH C. GORDON of Portland, Maine, read a paper on this subject. (See paper, p. 119.)

(*b*) *Immediate Results of Conservative Measures*

Dr. Hunter Robb of Cleveland, Ohio, contributed a paper with this title.

(*c*) *Conservative Operations*

Dr. J. Montgomery Baldy of Philadelphia followed with a paper on this subject. (See paper, p. 102.)

(*d*) *Facts and Figures of End-results in One Hundred Cases of Conservative Operations*

Dr. Walter P. Manton of Detroit, Michigan, read a paper with this title. (See paper, p. 144.)

He stated that in order to ascertain his own experience along conservative lines he had taken 100 cases from his note-books. Of the 100 women, there were 30 single, 64 married, and 6 not noted.

The following operations were done: Both ovaries were resected in 17 cases, right ovary in 26 cases, left ovary in 13 cases. Puncture of both ovaries was done in 22 cases, right ovary in 8 cases, left ovary in 14 cases. In 19 women the ovary of one side was found to be so largely involved as to require removal; the right in 6 instances, the left in 13. Resection was done in both tubes in 13 cases, the right tube in 4 cases, and the left tube in 9 cases. It was found necessary to remove one tube in 10 of the patients, the right in 4, and the left in 6 cases. The opposite side was left untouched or resected.

In the 100 women the immediate results were entirely satisfactory; that is, all the patients recovered from operation and were relieved from the sufferings of which they formerly complained. The mortality was therefore *nil*, and the results temporarily perfect. The majority of these cases remained under observation for at least three months. Following this quarter-year, 61 were known to be well at the present time; 31 had been lost sight of; 5 were doubtful, complaining of pelvic pain referable to the resected ovary, but in which no change could be detected on examination; and 3 had required a second operation for the removal of the conserved organ, which had undergone in each instance further cystic degeneration.

Of the 64 married women, 55, or 85 per cent, and of the 30 single women, 23, or 75 per cent, were well a year following operation. Of the 64 cases of whom knowledge was had a year or more following operation, 41 were married; of this number, 6, or 14 per cent, subsequently became pregnant; 4 of these were delivered at term; 1 aborted at the third month, and 1 was still pregnant.

From the foregoing he maintained that his own statistics and those of others showed that the conservative surgery of the ovaries and tubes, having passed the experimental stage, had established itself as a legitimate and successful operation in all the conditions to which it might be properly applied, and that it should be the operation of choice in all instances during the child-bearing age, where the diseased state of the organs admitted of its employment.

DISCUSSION

Professor Dr. M. Dührssen of Berlin, Germany, in opening the discussion on this symposium, stated that if permanent success after conservative operations on the adnexa was to be attained, care should be taken to remove all pathological conditions of the genital organs, and especially those of the uterus. Inflammatory conditions or displacements of the uterus, lacerations of the cervix, etc., had an irritative action on the adnexa, as well as the scars that were left behind, and made the success of the operation an illusion. This postulate was often neglected by German surgeons, who practised chiefly ventral operations. Vaginal cœliotomy, which was the proper operation in eighty per cent of these cases, worked against this neglect, since the necessary interference with the uterus was more easily carried out by the vaginal than by the ventral route. Following this postulate, the speaker said he did not hesitate to antefixate even an anteflexed uterus, and to excise diseased tubes from the horns of the uterus by both vaginal and ventral cœliotomy, as he had done in some cases in New York recently. Some months after operation a cauterizing treatment of the cavity of the uterus had to be done, since, occasionally, curettement and cauterization might not be sufficient to relieve thoroughly the chronic endometritis. At the end of this after-treatment, the discharge, as well as the pain in the sides, entirely disappeared.

In order to relieve the pain, a thorough extirpation of the diseased tubes was, above all things, very essential. A diseased tube should be left behind only when, after the removal of all adhesions, its ostium appeared open, and when a great desire for conception had been expressed. Under these circumstances, however, it might be found that either no conception or a tubal pregnancy occurred, or that the continuance of the disorders compelled one to make a supplemental operation for the removal of the second tube. He had never seen subsequent pregnancies after salpingostomy.

A chronically inflamed ovary might sometimes be left behind if the tubes had been removed,

without the fear that it would cause any substantial discomfort. It was always well, however, to resect any visible follicles, or to destroy them by ignipuncture. The author had seen pregnancy take place after the extirpation of the adnexa on one side, and the above-mentioned treatment of the ovary on the other. By means of this conservative mode of procedure, the woman retained her menstruation and sexual character, which, for psychological reasons, was of great importance to her.

Attention should be paid to the fact that pain emanating from other organs, such as an inflamed appendix, or an adhesion of the omentum to the abdominal scar, was often interpreted as coming from the adnexa after a conservative operation. This pain required the removal of an inflamed appendix in the first operation, or vaginal instead of ventral cœliotomy. After vaginal cœliotomy, adhesions between the peritoneal wound and the omentum were not possible.

By observing these precautions, and by always using catgut, the results of conservative operations on the appendages in which the uterus and at least the remains of one ovary were left behind were extremely favorable. The author could say, after a careful observation of over a thousand such operations, that any supplemental operation was necessary in only two per cent of the cases.

In women, therefore, under forty or forty-five years of age, extirpation of both appendages and the uterus was indicated only when both ovaries presented collections of pus, or when both ovaries had undergone total cystic degeneration. In young women under forty or forty-five years of age, if one was compelled to remove an inflamed or myomatous uterus, it was well to remove both tubes, but to leave at least one ovary behind, if it was normal to some extent.

Dr. Fernand Henrotin of Chicago stated that, so far as he could judge, at least thirty per cent of the women on whom he had operated conservatively on the tubes and ovaries, not including the septic and inflammatory cases of unusual type, remained partially cured, or a good many of them were fully as bad as before operation. The one particular thing he would draw attention to, because we were to give individual views, was the matter of conservative operations upon the pelvic organs of women, through the vagina.

With all due regard to and proper courtesy for Professor Dührssen, who came to us with a wide experience, he wished to emphasize the propriety of very carefully selecting cases for conservative work through the vagina. There was no one set of cases that needed more particularizing, more special watching and careful selection, than those of young women, because they were the ones whose tubes and ovaries were to be conserved. They were bad subjects for vaginal work, unless it should prevail that the vaginal route should be made the usual one. There was a great deal of doubt attending the method of attack in these cases, and, in his judgment, the vaginal route was to be used only occasionally, and in very carefully selected cases. Any operation that involved cutting the introitus vaginæ, the splitting up of the perineum, was not conservative of young women. If one had to split down the vulva in order to give room and to work on the adnexa, he thought he could do infinitely better work through the abdomen.

Dr. J. Riddle Goffe of New York City said the paper of Dr. Manton was very convincing. Those who insisted upon doing a radical operation in all cases claimed that their patients were all cured, that they had a hundred per cent of cures, whereas, according to the accounts given by Dr. Manton, they had only sixty per cent. This was a false position for them to take. It was known that a hundred per cent of patients were not cured by any operation, and those who did radical work would all admit that they had many failures. There were many cases in which they were unable to effect a cure. When a patient consulted a physician for the purpose of undergoing an operation, if that physician stated that he was going to cure her by removing the appendages, he was working on a false basis, because a large percentage of cases were not cured by radical means. Those who were doing conservative work knew that there was a certain number of cases that were not cured by conservative operations. The question was, whether the number of cases cured by conservative measures was greater than the number cured by radical measures. This was a fair proposition. We could come to a definite conclusion only by making a study of a certain definite number of cases, finding out from those men who do radical work how many cases they have failed to cure, and finding out from those who do conservative work how many cases they have cured and how many they have failed to cure. When the results of the two were compared, then we should have a basis for drawing deductions.

He did not believe it had been absolutely proved as yet that the ovary secreted a certain fluid or secretion which was absolutely necessary to a woman's health. However, he thought *data* were rapidly accumulating which pointed strongly in

that direction, and this was one of the hypothetical reasons, perhaps, why he believed in conservative work and in saving a fraction of an ovary in cases where he could do so, being reasonabl sure that the fraction that was left was healthy.

Dr. Philander A. Harris of Paterson, New Jersey, said in his experience ninety-five per cent of all women upon whom he had operated for the removal of pus-tubes in the past six years continued to menstruate afterwards; that not all of them were relieved of pelvic pains. It was a singular fact, however, that the women who gave a history of continuous dysmenorrhœa, and who had added to that increased pain before, during, or after menstruation, were, by the removal of their pus-tubes and the leaving in of the ovaries, relieved of the pains which were caused by the diseased tube. They were not, however, cured of the dysmenorrhœa which characterized their lives before they had acquired pus-tubes, so that in taking the histories he had been careful to find out whether patients suffered from dysmenorrhœa before there was a history of salpingitis. He thought he could confidently tell such patients that the removal of the pus-tubes would not cure the dysmenorrhœa which they had, but it would relieve all the pains which they had when the disease began. He had left in some tubes, desiring to be more conservative, and giving patients an opportunity to become pregnant; but he had to operate on those patients again, on account of infection of the tube or tubes. He had not accomplished much by conservatism as applied to diseased tubes. He could not always tell macroscopically when the ovaries were diseased, so that he did not leave them. If both ovaries were abscessed, and he desired to obtain for the woman menstruation, he would split a piece of the ovary in two, cauterize it with carbolic acid, and then neutralize it with alcohol and leave it. This would maintain menstruation.

Dr. Reuben Peterson of Ann Arbor, Michigan, thought the members were all agreed that in the removal of fibroid tumors of the uterus, it was well to leave in one or two ovaries. He had given both methods a fair trial. He had taken out more ovaries than he had left in after the removal of fibroids; but from a careful study of his cases he could not see that the women were any better, either symptomatically or in any other way, where he left in one of the ovaries or both ovaries after hysterectomy for fibroids, and after taking them out he had tried to follow the cases carefully.

He expressed his admiration of Dr. Manton for the manner in which he had worked up his one hundred cases. He asked if Dr. Manton examined the women themselves, or got reports from their physicians, or from the women themselves. If he got the reports from the women themselves, they were far different from those he usually received.

In regard to ovaries that were punctured, some four or five years ago he began to have microscopical examinations carefully made of parts of ovaries, or of certain ovaries he thought were diseased or that needed puncture, and the pathologist reported that he was puncturing normal ovaries, so that he made up his mind it would be a good idea to collect statistics of conservative operations upon the ovaries. Once in a while, as he followed the work, he would get an ovary that was two or three times the size of a normal ovary, and he would say that there was something which was pathologic. He would cut into the cyst, scrape it out thoroughly, sew it with catgut, send a specimen to the laboratory for examination, to find his hopes doomed. Report would come back that he had taken out a normal corpus luteum or an enlarged corpus luteum. So it seemed to him that this whole question was in a confused state. With increased experience and more extensive observation, he was prompted to do less and less conservative work on these organs.

Dr. I. S. Stone of Washington, D. C., said he had striven to do conservative work on the organs of women who were desirous of bearing children. In some instances he left one tube and an ovary. In pus cases, if necessary, he washed out the tube and left it. He had reported his conservative work on these organs in a recent article published in the *American Journal of Obstetrics and Diseases of Women*.

Many women were sent to gynecologists for dysmenorrhœa who had cystic ovaries. He had no reason to believe that he had cured any such case by removing a small cyst of the ovary, either by ignipuncture or by excision and closing over the remaining portion of the ovary.

A legitimate field for conservative work was in the relief of sterility.

Dr. William H. Baker of Boston, Massachusetts, said he believed in doing conservative work on ovaries whenever possible. He reported a case that occurred in his practice some years ago. The woman had suffered for a long time. Her physician advised her to have the ovaries removed. He operated, and found ovarian cystoma, on one side a diseased tube, and removed it. On the other side, there was a tumor of the ovary about the size of a hen's egg. He removed it and left a portion of the ovary, contrary to the wish of the physician who was present, and who begged

him not to leave it. He left about two thirds of one ovary. Both the husband, the wife, and physician in charge were very much disappointed. He felt, however, that he had done his duty. Within a year from that time the husband came to him saying that his wife was so well that he wanted to know whether it would be safe for her to have another child. He replied that he did not see any reason why she should not have more children. A year and a half later he received a letter from the husband, stating that they were the happiest couple on earth: "My wife has given birth to twin boys, ten pounds each."

Dr. Henry P. Newman of Chicago said the personal equation entered into the discussion of this subject. No one would arbitrarily say that in case one tube was involved and demanded removal, the other tube, if healthy, should also be removed. One should consider the social position of the patient, the skill of the operator, his own convictions, and the relative effects of operative work. In years gone by it was a rule to remove both tubes, even though one of them might be unaffected. He recalled the case of a prostitute who had involvement of one tube, the other being apparently healthy. She was a confirmed morphine *habitué*. He curetted very carefully, sterilized the endometrium as well as possible, made a V-shaped incision in the interstitial portion of the right cornu, and inside of two years this woman married and gave birth to a child. She was also cured of the morphine habit.

Dr. Manton, in closing the discussion, said the question was to be settled to one's individual satisfaction, and by his own experience. He could not agree with those who maintained that cystic conditions of the ovary caused little or no suffering. His experience had been that in a large number of cases they produced a good deal of suffering, and by relieving the tension of the cyst and destroying the cyst-wall the patient was relieved. He had seen this time and again, and was satisfied it was the proper thing to do.

In answer to the questions of Dr. Peterson, he stated that he had had a large number of patients under his personal observation for several years, and those he did not examine personally he heard from by correspondence, or had received reports from their physicians; therefore the percentage of recoveries as set forth in his paper could be relied on.

### PROGRESSIVE OPERATION FOR LARGE VESICO-VAGINAL FISTULÆ

Dr. Malcolm McLean of New York contributed a paper with this title.

He stated that in extensive destruction of the vesicovaginal septum it was necessary in most instances to attempt the closure of very small areas at each operation, selecting a line of approximation where the least tension was felt. After resolution of the tissues about the sutured portion had taken place, new points for denudation and suture would be found more tractable. Too much should not be undertaken at one sitting. Many of the steps might be done under local anæsthesia. Silver wire was to be preferred to other suture material. Steadying of the septum by the means of a distended rubber balloon introduced into the bladder during operation had been found of great assistance in operating on difficult cases.

### SURGERY OF THE GALL-BLADDER AND BILE-DUCTS

Dr. William H. Wathen of Louisville, Kentucky, contributed a paper on this subject.

The symptoms of gall-stones are so characteristic that an approximately correct diagnosis can usually be made. Gall-stones are never dissolved or removed by internal medication, but the severity of the immediate symptoms may be modified by good hygiene and the use of such treatment as may tend to remove gastroduodenal irritation and cholangitis.

When a diagnosis of gall-stones has been made, an operation for their removal is indicated, and as the mortality is practically *nil* when the operation is correctly performed before serious complications have developed, there should be no delay.

The gall-stones claimed to have been passed from the gall bladder or ducts, following the use of sweet oil, are only *gall-stone ghosts*. As no internal remedy will dissolve gall-stones, the internist must cease in his attempts to remove gall-stones, and refer such cases to the surgeon.

If the gall-stones are not removed, serious or fatal complications may at any time supervene, such as cholecystitis, — simple, phlegmonous, or gangrenous, — catarrhal or septic cholangitis, pericholecystitis, perforation or ulceration of the gall-bladder or bile-ducts into the peritoneal cavity or the intestine, or ulceration of the gall-stones into the liver. With few exceptions, large gall-stones that pass into the bowel do so by ulceration into the intestine, and not through the duct.

Drainage is indicated in all operations, and its necessity is imperative where we find inflammation of the gall-bladder, bile-ducts, or pancreas, with or without obstruction of the common or hepatic ducts.

If the gall-bladder can be safely attached to the abdominal incision, it is only necessary to suture a long gum-tube into its cavity and drain the bile into

a bottle by the side of the patient, thus avoiding soiling the dressing or changing it for about ten days. Where the gall-bladder cannot be sutured to the abdominal incision, and in cases where the stones are removed from the common duct, in addition to the drainage through the tube sutured into the opening, a split tube filled with gauze should be placed immediately under the first tube, so as to protect the patient against the possible danger of bile-leakage into the peritoneal cavity. The incision in the duct should never be sutured, unless drainage is established through the gall-bladder, with a patulous cystic duct. Cholecystenterostomy should never be established, except as a *dernier ressort* when other means have failed or cannot safely be established.

Cholecystendisis, or so-called ideal cholecystotomy, is in no sense ideal, is dangerous, and nearly always contraindicated.

Cholecystotomy or choledochotomy and drainage will cure most cases, but cholecystectomy is indicated when the gall-bladder is thickened and seriously altered, is contracted in a cicatricial mass around gall-stones, or is involved in carcinomatous degeneration, or the cystic duct so obstructed that drainage cannot be re-established into the gall-bladder, and also when the gall-bladder is gangrenous, and in some cases of phlegmonous cholecystitis.

In operations for gall-stones, the cystic, common, and hepatic ducts should be carefully examined to see that no gall-stones are left to obstruct the free flow of bile into the duodenum. We should also examine the pancreas for duct-obstruction, pancreatitis, carcinoma, or tumors. Gall-stones or pancreatic concretions in the ampulla of Vater, are best removed by the transduodenal method.

With the Robson incision, by pulling down and rotating the liver, the direction of the cystic duct and common duct is practically in a direct line, thus enabling the surgeon to introduce a sound or scoop through the opening in the fundus of the gall-bladder into the duodenum.

By the use of the sand-bag under the back, and pulling down and rotating the liver, most operations for gall-stones may be performed extraperitoneally, thus converting what was formerly a difficult operation into a simple one.

### THE TREATMENT OF VESICOVAGINAL FISTULÆ

Dr. I. S. Stone of Washington, D. C., said experience had shown that wounds of the bladder made during the performance of surgical operations healed readily after careful application of sutures. This occurred after injuries at the base, as in vaginal hysterectomy, as well as in those at or near the fundus, which were comparatively frequent in operations upon the uterus for the removal of tumors. Two principal causes contributed to this result. One was the healthy condition of the bladder itself, and another was the ease with which the muscular wall of the organ could be approximated when absolutely free from the uterus or vaginal wall. It had been his experience that the very large fistulæ afforded such free drainage as to secure perfectly healthy mucous surfaces of both bladder and vagina, the only exception being in one bed-ridden patient, who had been indifferently cared for, and whose fistula was covered with incrustations. It would be found in many instances that large fistulæ had persisted, because they were associated with injury of the vagina of a serious character which produced extensive cicatricial contraction. Such an injury was worse than a mere incision or laceration of the vaginal wall, and included the connective tissue also, which became a permanent retractor to the margins of the fistula, and prevented its closure until surgical relief was afforded.

He had found it unnecessary to treat these cases by the tedious method of Bozeman, and now felt confident that any fistula could be closed satisfactorily by first liberating the bladder from any adherent surface or organ which prevented its closure, and then by uniting the margins of the fistula with catgut, and afterwards, at the same sitting, by utilizing the vaginal wall and uterus, as might be needed to support the line of sutures in the bladder-wall. This was opposed to the contention of those who favored suture of the supporting base only — the vaginal wall, for example. Finally, one might draw the vaginal walls forward after suitable dissection, or he might utilize the uterus, as suggested by Kelly, which was done by drawing forward the cervix and making it secure with sutures to the anterior margins of the fistula or by using the Freund method of turning the fundus downward and then forward into the opening. This last method seemed to him quite objectionable, as it necessitated the new opening of the cavity of the uterus to provide for the escape of the menstrual flow. He had overcome the disadvantages of this method of Kelly's, and had obtained abundant mobility by drawing down the uterus, cutting away the anterior vaginal wall, and dividing the broad ligaments, so as to cause less traction upon the sutures. This had also been accomplished by separating the bladder from the uterus and broad ligaments through an abdominal incision, and by a division of the broad ligaments at their upper border where they were attached to the uterus.

This method had been used for the relief of fistula of any description.

The profession owed acknowledgment to Mackenrodt for priority and for clearly establishing its usefulness in almost any fistula, of whatever shape, position, or size. In the treatment of small fistulæ, the vaginal wall should be divided longitudinally, the bladder separated from the vaginal wall, then united, and the vaginal wall closed, each independently. He had found its best and most useful application in the closure of large fistulæ, and where failure had resulted after previous attempts at cure. Illustrative cases were cited in which excellent results were obtained.

Dr. William S. Stone of New York followed with a paper on The Technique of the Repair of Large Vesicovaginal Fistulæ. (See paper, p. 107.)

Dr. Howard A. Kelly of Baltimore discussed the subject of abdominal extraperitoneal and abdominal transperitoneal operations. He pointed out the best way to expose a difficult vaginal fistula, and emphasized the importance of preserving the uterus. He dealt with the methods of approximation in one layer or in two.

Dr. J. Wesley Bovée of Washington, D. C., reported two cases of hypernephroma renis, with remarks. (See paper, p. 96.)

Dr. George H. Noble of Atlanta, Georgia, contributed a paper on Intramural Abscess in the Puerperal Uterus.

Dr. George M. Edebohls of New York City reported a third case of renal decapsulation for puerperal eclampsia.

### OFFICERS

The following officers were elected for the ensuing year: President, Dr. Clement Cleveland, New York City; First Vice-President, Dr. J. Clifton Edgar, New York City; Second Vice-President, Dr. Willis E. Ford, Utica, New York; Secretary, Dr. J. Riddle Goffe, New York (re-elected); Treasurer, Dr. J. M. Baldy, Philadelphia (re-elected); Member of the Council, Dr. Richard D. Maury, Memphis.

Washington, D. C., was selected as the place for holding the next meeting in 1907, in conjunction with the American Congress of Physicians and Surgeons.

# ABSTRACTS OF CURRENT LITERATURE

## DEPARTMENT OF SURGERY

UNDER THE CHARGE OF

JOHN B MURPHY, M. D.
FREDERIC A. BESLEY, M. D.
E. WYLLYS ANDREWS, M. D.
WM. R. CUBBINS, M. D.

TRAUMATIC DEFECTS OF THE SKULL: THEIR RELATION TO EPILEPSY. A clinical and experimental study of their repair. By Dudley P. Allen, M. D., Professor of Surgery, Western Reserve University, Cleveland, Ohio; Henry L. Sanford, M. D., Assistant Surgeon, Lakeside Hospital Dispensary; D. H. Dolley, M. D., Former Resident Pathologist, Lakeside Hospital.

Injuries of the skull, if unoperated, often leave depressions; if operated, defects of bone. Such injuries often have as their result headache, dizziness, and epileptic attacks. These symptoms may be caused by depressions of bone, or if there be a defect of bone, by pressure of cicatricial tissue upon the brain substance. If, in addition to the injury to the bone, the brain be lacerated, this injury to brain may produce similar results. If the symptoms be due to injury to bone, they may be relieved by the removal of that portion of bone which is pressing upon the brain. If the symptoms be due to cicatricial tissue, its removal will only relieve the symptoms which have been produced by it. If the symptoms are the result of damage to the brain tissue, they cannot be relieved either by the removal of bone or scar tissue. Even if the brain itself was not damaged by the original injury, the long-continued pressure of depressed bone upon it may cause permanent damage to the brain substance, which cannot be relieved by late operation and the removal of the depressed bone. That epilepsy is often the result of traumatism is shown by statistics taken from the history of the Civil War, the Franco-Prussian War, and other sources.

It being concluded that epilepsy often results from injuries to the skull, the questions considered in the paper were five.

1. Can the condition be relieved by operative interference?

2. At what period should such operations be performed?

3. What class of cases is suited to operation?

4. What are the defects of methods commonly in vogue?

5. What operative procedures are best fitted to give permanent relief?

1. It was shown that a considerable percentage of cases of traumatic epilepsy are relieved by operation. It was also shown that in case of skull defects with the resultant pressure of scar tissue upon the brain, the symptoms of epilepsy are relieved, temporarily at least, by the removal of the scar tissue.

2. Operations should be performed at as early a date as possible.

3. Cases recommended for operation. (*a*) Recent cases with infrequent attacks of epilepsy. (*b*) Cases having manifestations described as Jacksonian epilepsy. (*c*) Cases having upon the scalp or skull evidences of previous injury.

4. Direct issue was taken with the recommendation of Kocher and of Schar and Beresowsky of Moscow, to the effect that the best results are obtained by leaving permanent defects in the skull.

5. After considering the various methods which have been proposed for repairing defects of the skull, the author pointed out a method by which these defects had been covered by bone in seven successive cases. The method had succeeded in each case. There then follows a description of the method used upon human beings. An experimental study of the method had also been made upon dogs, and the result had been studied by microscopic sections taken from the skulls of dogs at various periods after operation. The periods were two weeks, one month, two months, four months and five months.

The method was first employed by the author on August 22, 1900. At that time the author did not know of the Müller-König method. The method is as follows:

The scalp is removed from over the defect in the skull, and the connective tissue covering the brain is carefully dissected away. Since the scar tissue and dura are often inseparable, the pia mater

covering the brain tissue may thus be exposed over the entire area. In certain cases in which the injury to the brain tissue has occurred as the result of traumatism, it may be necessary to trim away a portion of the brain with the scissors, since the connective tissue may be firmly connected with the brain tissue itself. The borders of the opening are carefully examined to see if any portion of the bone projects downward, and if so, it is removed by means of rongeur forceps. Any hemorrhage which occurs is carefully stopped, since it is an essential part of the operation that all hemorrhage shall be controlled before the bone flap is inserted. When the surface upon which the bone flap is to be implanted has thus been made clear and hemorrhage has been checked, the scalp is removed from an added area of the skull of equal size with the opening. In doing this, care is taken that the periosteum covering the skull is left intact. It is also important that the portion of skull laid bare be as thick as possible. Thus the posterior parietal region is preferable to the temporal region. Upon the area thus laid bare a circular or elliptical incision is made, blocking out a portion of periosteum equal ing in form and size the defect which is to be covered. A sharp, narrow chisel is then employed to split from the outer surface of the skull the portion of bone adherent to the overlying periosteum. To separate this bone from the skull, the blows of the chisel should be short and quick, so that the portion of bone split away reach no deeper than the diploë. In the removal of this area of bone with attached periosteum, the tendency, of course, is for the bone to be separated into small fragments, and to roll upward and outward. By placing the graft thus obtained between two gauze sponges moistened in warm normal salt solution and laying it upon the table, it may be flattened out by a few slight blows of the mallet. The plate of bone thus prepared is laid upon the opening in the skull, the bone being next to the brain. The wound is then closed by drawing over it the scalp and suturing it loosely in place. A cigarette drain made up of gauze and surrounded by gutta-percha protective tissue is inserted through the incision at the dependent point, so that any excess of blood may be drained away into the dressing. The dressings are changed ordinarily on the second day, in order to remove the cigarette drain, after which a second bandage is applied. This bandage remains in place perhaps six or eight days longer, or until the wound has entirely healed.

The experimental work conducted by Dr. Sanford and the histological work conducted by Dr. Dolley were then described.

It was shown that bone grafts implanted in the defects of the skull in operations upon dogs grew in place.

Histological investigation showed that the growth was from the periosteum, the bone graft, and also from the edges of the bone about the opening.

The conclusions of the paper were:

1. Defects of the human skull can be covered by bone.

2. The bone may be secured from a portion of skull adjoining the defect.

3. This bone graft represents essentially the outer table of the skull, with the periosteum covering it.

4. No pedicle need be preserved in order to insure the viability of the bone graft.

5. Experiments on dogs show the graft to be solid at three months.

6. Histological examination shows that the bone remains viable and grows into its new position. — *Read at the Meeting of the Boston Medical Library, December* 6, 1905. *Published in the Boston Medical and Surgical Journal*, April 12, 1906.

A Simple Aseptic Surgical Technique. By Dudley P. Allen, M. D., Professor of Surgery, Western Reserve University; Visiting Surgeon to Lakeside Hospital; Consulting Surgeon to Charity Hospital and the City Hospital, Cleveland, Ohio.

The paper details a series of 377 observations, made by taking cultures from the hands after they had been incased in rubber gloves during operation. Various methods were used. As a result of these bacteriological examinations, it was concluded that a thoroughly reliable asepsis could be secured by the simplest means.

The hands and arms are washed in soap and water, the use of the scrub-brush being confined to the palms of the hands and the nails. In washing the backs of the hands and arms after the use of soap and water, a towel or gauze is used in order that the washing may be thorough. Afterwards the hands and arms are immersed in a solution of bichloride of mercury. The rubber gloves are then put on while filled with the same solution. No germicide, other than the bichloride, is used.

In a series of operations upon 2,139 clean cases, which included 687 clean laparotomies, there were but two deaths which could be ascribed to sepsis; one followed an operation for chronic appendicitis and one a gastroenterostomy. There were but two other cases of serious sepsis. In one, erysipelas followed an operation upon an olecranon

bursa, and in the other, suppuration occurred after an operation for the fixation of a kidney.

There remains a very small percentage of infections, mostly stitch abscesses, and the majority of these stitch abscesses were in cases in which buried chromic-gut sutures had been used to close deep layers of fascia.

The writer pointed out that the disadvantages of many methods of cleansing the hands was that the integument was damaged by too much scrubbing or by too irritating antiseptics. The advantages of the gloves are, not only that they protect the patient from sepsis, but at the same time they protect the hands of the operator from infection.

The special considerations leading to the presentation of the subject before the American Surgical Association were, first, the widespread use of irritating disinfectants for cleansing the hands, and second, the limited acceptance which the rubber gloves have met among foreign surgeons. — *Printed in the Révue de Chirurgie, Paris, France*, vol. xxxii, 1905, p. 445, *and in the Transactions of the American Surgical Association for* 1905.

Cardiac Stimulation for Suspended Animation by Direct Digital Manipulation. Illustrated by diagrams and case reports. A supplementary report to *Surgery of the Heart and Lungs*. By Benjamin Merrill Ricketts, M. D.

The various methods for determining death are considered, among them that of Foubert, who bases his sign of death upon this definition. He says, if the heart is found not to pulsate, dissolution has taken place. He introduces the finger through the intercostal space to the heart to determine this.

With him, the introduction of the finger was to condemn to death. Now the introduction of the finger is to restore life.

No known methods of determining death are positive in non-mutilated bodies, within several minutes after cessation of the heart-beat.

Cardiac contraction has been induced many hours, and even days, after death has been made positive.

No one method should be employed to the exclusion of all others until more definite knowledge upon this subject is obtained by experimentation and observation upon the various forms of animals, both living and dead.

The case at Brighton, England, November 11, 1905, is cited as an illustration to show the force of this argument. The child, nine days old, lived sixteen hours after the physician had pronounced it to be dead.

The class of cases in which rhythmic massage of the heart is appropriate is, suspended animation due to either chloroform, nitrous oxide, carbon dioxide, shock due to fright, injury, or surgical operation, drowning, electrocution, strangulation, loss of blood, and probably disease, and drugs of many kinds.

Experimental resuscitation by rhythmical cardiac compression was first practised by Schiff in 1874, and Ricketts in 1877. Defibrinated blood, sodium, adrenalin, chloride, and Lock's solution are mentioned as of especial interest.

Hearts removed from both the live and dead body have been subjected to heat and cold, both dry and moist, for periods of time varying in length, and found to contract when subjected to the electric current.

It has been shown that lack of potassium salts renders the vagus wholly or nearly ineffective, and the increase of calcium has no effect on vagus control.

Intrathoracic transpericardial cardiac massage was first done by Niehaus in 1880. It is done after making a horseshoe incision through the cutaneous structure, and dividing the third, fourth, and fifth ribs from right to left or left to right, preferably turning the flap from right to left. The hemorrhage is insignificant, unless the internal mammary artery is injured. The pericardium is exposed and divided, that the heart may be grasped between the thumb and forefinger. Care should be taken not to open the pleural cavity, but if this has been done, the opening in the pleura should be disregarded.

Of the 21 cases reported, 2 were complete recoveries, 11 lived 1 minute to 27 hours, and in 9 the pulse never returned. In 19 the chest was deliberately opened, and in 2 the chest was already opened. In 16, chloroform was used, and in 4 not stated. In one recovery the heart did not beat for three minutes, while in another it did not beat for one minute. Of those that died, in 1 the heart did not pulsate for 60 seconds, and then lived for 27 hours before dissolution. In 2 others the heart did not beat for 15 minutes; 1 lived 16 hours before final dissolution.

Subdiaphragmatic transperitoneal cardiac massage is supposed to have been first done by Starling and Land in 1902. The heart is grasped with the hand, with the diaphragm intervening, 18 having been treated in this way, in 8 of which the abdomen was deliberately opened for the purpose, and in 10 the abdomen had already been opened for other purposes; in 3, chloroform was used; in 10, not stated; in 3, the diaphragm was

deliberately opened from below to massage the heart; 10 permanently recovered; 8 died, in 5 of which the pulsations were restored for a short time, and in 3 the pulsations were not restored. Of the 8 in which the chest was deliberately opened, 3 recovered; and of the 10 cases in which the abdomen had already been opened, 5 recovered. Of the 10 recoveries, in 1 the heart ceased to beat in 1 minute; in 1, 4 minutes; in 1, 10 minutes; in 1, 1 minute plus the time required to open the abdomen; and 7 not stated. — *Read before the Surgical Section of the American Medical Association, Boston*, June 5–8, 1906.

PRIMARY MALIGNANT DISEASES OF THE VERMIFORM APPENDIX. By H. D. Rolston, M. D., and Lawrence Jones, M. D.

Under the above heading the authors have reviewed the literature of the subject most carefully. They add one new case to those already reported.

The cases are well analyzed. There were found 63 cases of malignant disease of the appendix in the literature. Of these, 21 cases were excluded, because of the lack of sufficient evidence of their malignancy, leaving 42 cases available for analysis.

There are 33 instances in which primary malignant disease was found in appendices removed during life, but the nature of the disease was not suspected in any case before operation.

The average age is 30.8 years. Men and women were about equally subject to the disease.

The extent of operation called for by the diseased appendix but rarely exceeded the simple removal of the appendix.

The results of the operation, immediate and remote, have been surprisingly good.

The following conclusions are arrived at from an analysis of the cases.

"1. The disease is one which renders an accurate diagnosis impossible; every case in which the symptoms drew attention to this region exactly imitated appendicitis in some form.

"2. Most of the older reputed examples fail to withstand investigation, but as 80.9 per cent of the 42 genuine examples have been reported since 1900, the disease cannot be quite so rare as has been thought. The microscopic size of the growth in some cases makes it probable that many such cases have been overlooked.

"3. Pathologically, several varieties of carcinoma have been reported, and also sarcoma and endothelioma. The growth is usually, however, a spheroidal-celled carcinoma, which is peculiar in the early age incidence, the slight malignancy, and the resemblance to endothelioma. Colloid change is not common, as has been hitherto supposed.

"4. The presence of concretions is mentioned only in 3 cases out of the 42.

"5. The disease is not prone to affect one sex more than the other.

"6. Inflammatory changes, either chronic or acute, very frequently accompany the growth.

"7. The immediate prognosis and the prospect of freedom from subsequent recurrence after operation are very good, particularly in the spheroidal carcinoma. — *Amer. Jour. of Med. Science*, June, 1906. F. A. BESLEY, M. D.

# ABSTRACTS OF CURRENT LITERATURE

## DEPARTMENT OF GYNECOLOGY

UNDER THE CHARGE OF

J. Clarence Webster, M. D. — E. C. Dudley, M. D
John C. Hollister, M. D. — F. W. Lynch, M. D.

The Uses and Abuses of Certain of the More Simple Gynæcological Procedures. By Hunter Robb, M. D., Professor of Gynecology, Western Reserve University, and Visiting Gynecologist to Lakeside Hospital, Cleveland, Ohio.

In the first years of gynæcology as a specialty, the gynæcologist did very few major operations, and depended — in season and out of season — upon a routine of topical measures. Then came the mania for operating, and thousands of healthy ovaries were sacrificed. Fortunately, the gynæcologist learns by experience, and time having taught him that the operative removal of a gynæcological lesion did not always cure the patient, but sometimes left her a physical and mental wreck, he learned to stay his hand and more often to make trial of less radical measures. Certain minor gynæcological procedures — so often abused formerly, and even now — have nevertheless a certain definite value, and a thorough understanding of their uses and abuses will certainly be of service to the general practitioner, and the specialist in dealing with patients who come to them complaining of what are presumably gynæcological disorders. It may therefore be of some profit to discuss the uses and limitations of: 1. The bimanual examination; 2. The vaginal speculum; 3. The tampon; 4. The uterine sound; 5. Applications to the cavity of the uterus; 6. The vaginal douche; 7. The pessary; 8. Dilatation and curetting.

1. In married women, a bimanual examination is permissible in the majority of cases, and where doubt still exists, should be supplemented by an examination under anæsthesia. On the other hand, in the case of anæmic or neurotic girls — unless there is a history of periodical colic without any menstrual flow, unless external examination has proved the existence of an abdominal tumor, or the history points strongly to a gonorrhœal infection — we should certainly confine ourselves at first to a thorough external physical examination, institute treatment based upon the indications thereby afforded, and then wait a few weeks before insisting upon a bimanual examination. In unmarried girls, where a bimanual examination seems to be imperative, anæsthesia should be employed, and, as a rule, the examination should be made by the rectum.

2. For a skilled examiner the vaginal speculum is not necessary, but it can be used to advantage during certain operations, and in taking stitches out of the cervix or vaginal walls. In the rare instances in which a speculum is employed in examinations, those of the ordinary type should not be used for unmarried women. A small cylindrical speculum is much preferable in these cases.

3. If encouraged, women are apt to form the "tampon habit." Properly applied, tampons often do good in cases of subinvolution of the uterus, and chronic salpingitis or ovaritis, and much more rarely in cases of retrodisplacement of the uterus. But they must not be applied too frequently or over too long a period, as the necessary manipulations often cause irritation. In applying a tampon, the patient should be in the knee-breast posture, which causes the pelvic organs to gravitate towards the abdomen, so that as soon as the speculum is introduced the vaginal walls separate and the tampons can be placed behind the cervix and to either side of the median line of the body. Several small tampons are better than one or two large ones.

4. The uterine sound has often caused abortion, especially in the hands of the young and unsuspecting physician. The specialist may use it in ascertaining the length of the uterine cavity before dilating and curetting, but only after the possibility of pregnancy has been excluded.

5. Irritating drugs applied to the cavity of the uterus rarely do good. They sometimes cause poisoning. Intrauterine douches of bichloride of mercury have often caused severe cramps and shock, and many patients have died from the effects of the poison. Again, the use of a counter-irritant in the uterus may render the parts more

susceptible to bacterial invasion, and thus facilitate extension of the pathological process to the adnexa.

6. The vaginal douche is often given improperly. Here a proper technique is of the utmost importance. It must not be ordered as a routine procedure, but, properly used, it does good in acute inflammation of the vagina, uterus, or lateral structures, and in cases of hemorrhagic or foul discharges from a cancer of the cervix.

7. The pessary is not a panacea, as was formerly thought, for all displacements or supposed displacements of the uterus. In this connection arises the question, What is the normal position of the uterus? In simple displacements of the uterus, a well-fitting and properly applied pessary undoubtedly sometimes does good, but when inflammation of the adnexa coexists, a pessary would often act as an irritant. Again, the existence of a displacement often gives no inconvenience to the woman, if her general health is looked after, and her attention is not drawn to her pelvic organs. An experience of over twenty years has taught me that there are only a few cases of anteversion or anteflexion of the uterus which are benefited by the use of the pessary. On the other hand, a prolapsed uterus really needs a mechanical support, if for some good reason operation is contraindicated.

In using a pessary, several rules must always be observed.

(*a*) The pessary must be of the right size, and must be inserted in such a way that it acts as a support without causing irritation.

(*b*) It must be removed at intervals of from two to four weeks, in order that it may be cleaned, and the physician must satisfy himself at the same time that it is causing no ulceration of the parts.

(*c*) Before the pessary is again inserted, and every seven days thereafter, the patient should be given a vaginal douche.

8. Dilatation of the cervix and curetting of the uterus are not to be undertaken as a routine procedure. Neither are they so simple or so free from danger as is often supposed. It must be insisted upon that a large proportion of cases of dysmenorrhœa are nervous in origin and are made worse by local treatment. When a patient comes complaining of painful menstruation, we should first determine whether the uterus and lateral structures are normal. Even when this is the case, dilatation will usually fail to give permanent relief unless the pain is of a spasmodic character, and most marked during the first of the flow. Dilatation must be performed very carefully, in order to avoid laceration. I prefer to dilate (with the Goodell-Ellinger instrument, without the ratchet attachment) first in one direction and then in the other, gradually increasing the force employed. Curetting may be indicated in actue and various forms of chronic endometritis, and in other conditions, such as mucous polypi, carcinoma, and abortion. In abortion, in order to minimize the danger of sepsis following trauma, any remnants should be first removed with the fingers, protected by the rubber glove. Curetting should be performed with the utmost gentleness. If perforation occurs, irrigations of the cavity should not be employed, but a piece of sterile gauze should be lightly applied, and another piece wet with 1-5000 bichloride solution should be left in the vagina. Only in exceptional cases will it be necessary to open the abdomen and stitch the tear. In cases of a septic uterus, or when peritonitis occurs, drainage through the cul-de-sac may be instituted. — *Abstract of a paper read before the Clinical and Pathological Section of the Cleveland Academy of Medicine*, November 3, 1905.

Dystocia Due to Uterine Myomata. By Esch (Olhausen's Clinic).

The writer reports two cases.

1. The patient was a two-para, thirty-seven-year-old woman with a subserous myoma which filled the greater part of the true pelvis and the pouch of Douglas. The child presented by the foot, in the left position. After pains for two days, the membranes having ruptured, the tumor had risen out of the pelvis, so that extraction was possible. The babe succumbed on the sixth day to injuries sustained at birth, and the puerperium was complicated by thrombophlebitis, with pulmonary embolism, on the part of the mother. Eighteen months later the same woman was at term. The child was in the left position, occiput presentation, and by this time the cul-de-sac and true pelvis were entirely occupied by the tumor. After three days of labor without results, a classical Cæsarean section was performed. At the same time the myoma was removed from the posterior uterine wall. On the twenty-first day both mother and child were discharged in good condition.

2. The second patient was a twenty-eight-year-old primipara with a solid, subserous myoma, almost as large as a fœtal head, involving the posterior wall of the uterus, in addition to which there were various small, subserous and intramural tumors. The child presented by the breech, left position, the pouch of Douglas, and the true pelvis being filled by the tumor, which was immov-

able. Labor for twenty-four hours brought no results, and the case was terminated by Cæsarean section with supravaginal amputation of the uterus. The child was saved, and the mother went through an uneventful convalescence.—"*Therapie des durch Myoma uteri bedingten Geburtshindernisses*," *Ztrabl. f. Gynäk.*, XXX, 17, 1906.

CAREY CULBERTSON.

LEUCORRHŒA. By Siredey and Bigart.

The writers differentiate simple functional leucorrhœas from those due to the infective processes as follows:

1. Simple vaginal leucorrhœa is characterized by: (*a*) flat cell of the vagina, numerous; (*b*) similar cells which do not stain so well; (*c*) scattered cellules with proliferating nuclei; (*d*) lymphocytes; (*e*) numerous cocci and bacteria among or within the cells.

2. Secretions of genital infections show: (*a*) few normal flat vaginal cells or columnar cells from the cervix; (*b*) numerous degenerated vaginal and cervical epithelial cells; (*c*) many polymorphonuclear leucocytes, indicating suppurative processes of the genital tract; (*d*) fewer microbes than in normal secretion, the gonococcus being frequently present.

The micro-organisms are very varied, but correspond well enough with the clinical findings to make the microscopical examination worth while. By this, also, it is possible to distinguish between acute and chronic processes. The microscope is of particular value in gonorrhœal infection, though repeated examinations, of most avail directly after a menstrual period, are insisted upon. Long bacilli and streptococci are found oftenest in normal secretions, whereas in infected discharges short microbes (cocci) appear in group and chains. Hence, during treatment, the reappearance of the ordinary forms may be taken as evidence of improvement. — *Annales de Gyn. et d'Obstét.*, Dec., 1905. CAREY CULBERTSON.

CYSTIC DEGENERATION OF THE OVARY. By Vautrin.

Vautrin's study is of cystic degeneration after certain interventions for chronic adnexitis. He first considers that which happens to the ovaries, or remnants of ovaries, left in the midst of pelvic exudate after vaginal operation; secondly, the fate of those ovaries saved for the sake of functional effect, after salpingectomy by the abdominal route. He gives the history of nine cases in detail, and, after discussing the conditions fully, arrives at the following conclusions.

1. Where the operation has been done for old adnexitis, more or less abated, it is a mistake to leave in the pelvis an ovary, whole or in part.

2. The ovary, left in the midst of pelvic exudate, is apt to give place to cystic degeneration. These cysts at times increase considerably in volume, and are rendered liable to malignant changes.

3. Cystic tumors thus developed are dangerous: (*a*) because of the pain and of the pressure which they produce; (*b*) because of their involvement in the pelvic exudate, in the broad ligament, or in the pelvic peritoneum; (*c*) because of the difficulty of the operations which they necessitate.

4. Chronic adnexitis is not amenable to treatment by colpotomy.

5. They demand vaginal section less and less, an operation which allows portions of ovaries susceptible to subsequent degeneration to remain in the pelvic exudate.

6. Salpingectomy by the abdominal route with conservation of the ovary, with or without the uterus, makes possible the preservation of an altered ovary organ gland which eventually undergoes degeneration. Such conservation will be indicated only in the exceptional case.

7. The operation of real value is the radical one, panhysterectomy by the abdominal route.—"*De la dégénérescence kystique des ovaries*," *Annales de Gynéc. et d'Obstet.*, Feb., 1906.

CAREY CULBERTSON.

# ABSTRACTS OF CURRENT LITERATURE

## DEPARTMENT OF OBSTETRICS

UNDER THE CHARGE OF

C. S. BACON, M. D. RUDOLPH W. HOLMES, M. D.
C. V. BACHELLÉ, M. D.

HEART DISEASE AS A COMPLICATION OF LABOR AND PREGNANCY. By F. S. Clark, M. D., Cleveland, Ohio.

The effect of pregnancy on a normal heart is still a subject of dispute, though it is reasonable to expect hypertrophy. There is no di pute as to its effect on a diseased heart.

Heart disease is found in 2 to 2½ per cent of cases of pregnancy, and usually in the form of valvular lesions. The danger to mother and child is such that our advice should be against pregnancy in those suffering from these affections. If pregnancy occurs, the patient should be under careful supervision during the whole period. Full directions should be given regarding exercise, diet, dressing, and bathing. and the action of the kidneys and bowels.

Some cases will go to the beginning of labor without the need of heart tonics. In cases of beginning failure of compensation, they should be given cardiac tonics, as digitalis or strophanthus. The first-stage pains are not so dangerous to the patient as the second-stage pains, and as this stage approaches, forceps should be used. The use of an anæsthetic is less dangerous than to allow the labor to continue. In a slow first stage, manual dilatation may be necessary.

After labor, there is danger of overdistention of the heart, especially in mitral stenosis, and allowing some hemorrhage in such cases is of value. In other cases, post-partum hemorrhage is a great danger, and must be guarded against, but ergot should not be used, other means for controlling it being adopted. Cerebral and pulmonary embolism and pulmonary œdema are complications to be borne in mind; the latter, however, is the only one that can be anticipated or treated very successfully.

The child should not be nursed. The patient should not be allowed to exert herself, or to get up too early, as sudden death may follow.—*Read before the Cleveland Academy of Medicine. Published in Cleveland Medical Journal*, March, 1906.

THE MANAGEMENT OF OCCIPITO-POSTERIOR POSITIONS. By Arthur H. Bill, M. D.

The writer discusses the various methods usually employed in handling cases of persistent occipito-posterior positions, and advocates the use of Scanzoni's maneuver. From the series of cases reported in which he has used this procedure successfully, he concludes that all rotating with the forceps should be done well down in the pelvic cavity, and after the head is entirely outside of the cervix. In the cases in which the head was above the brim, it was drawn down into the pelvis in its posterior position and then rotated. In some of the cases the occiput was in the hollow of the sacrum, and the head was rotated through 180°. The writer prefers the solid-blade forceps. Lacerations of the maternal soft parts may be avoided in the majority of cases by the proper use of Scanzoni's maneuver. The article includes a number of important rules, which should be carefully followed, in order to insure success.—*Cleveland Medicine Journal*, February, 1906.

VERATRUM VIRIDE COMPARED WITH LUMBAR PUNCTURE IN THE TREATMENT OF ECLAMPSIA. By F. Mirto.

This article is of value in the large number of cases treated, as well as being a careful study of the therapy of eclampsia. Krönig's and Helwe's cases of lumbar puncture are first referred to, and the deduction of the former accepted, that intercranial pressure does sometimes rise and that the total quantity of cerebrospinal fluid may be increased. As a result, however, of Henkel's publication in 1904, Mirto concludes that eclamptic convulsions are not caused by increased intraspinal or intracerebral pressure. Accordingly, he has taken up the veratrum viride treatment, and reports on 61 cases so cared for. Of these, 5 died, a mortality of 8.04 per cent. Twenty of the cases were multiparæ, with 3 deaths, or 15 per cent, while of the remaining 41 primiparæ but 2 died, or 4.9 per cent; thus proving a higher mortality in the former than in the latter. Of

these 5 deaths, it should be stated that 1 was moribund on admission, 1 succumbed to bronchopneumonia on the thirteenth day, and 1 to sepsis after two weeks. The veratrum diminished the number and intensity of the convulsions, and was even used along with milk diet, as a prophylactic in albuminuria of pregnancy, especially where the pulse tension was high. Five to seven minims of the standardized drug was used for each injection. The writer concludes with a description of experiments aimed at certain ætiological factors, based on the theory that the exciting cause of the convulsion is a spasm of the arterial system. His results were unsatisfactory, however. — *Annali di Ostet e Ginacol.*, Dec., 1905.

CAREY CULBERTSON.

"DWARFS," CONSIDERED FROM AN OBSTETRICAL POINT OF VIEW. By A. Herrgott.

Only the clinical phase of this question is taken up by Herrgott, no attempt being made to discuss the ætiological factors as pointed out by Caruette or the congenital osseous dystrophies described by Porak and Durante. The subject is considered under two headings.

1. Physiological dwarfs. By this term Herrgott means the African dwarfs described by Schweinfürth and Verneau, and but few words are necessary. These races are symmetrically small, but not deformed, their pelves and fœtuses being, for them, normal.

2. Pathological dwarfs. These are very different, of considerable variety, and are described in detail with a number of illustrations. Herrgott regards lesions of the thyroid gland as foremost among the causes leading to this condition. A general arrest of development is a marked characteristic of myxœdema, fecundation, however, being extremely rare. Certain cases are cited in detail, with obstetrical histories, by way of illustration. In one woman, eighteen years old, only 1 m. 21 cm. in height, radiography disclosed a lack of fusion of the ilum, ischium, and os pubis in the cotyloid cavity. The pelvis was a generally contracted one, of an infantile type.

Rachitis is a more frequent cause of pathological dwarfing, characterized by a markedly contracted pelvis, symmetry being rarely maintained. Arrested development here is the chief factor in the justominor type, body weight on softened bones being an additional factor where the pelvis is both contracted and flattened. This latter is the worst pelvis obstetrically.

A rare cause of dwarfing is the congenital osseous dystrophy, where the defect is in periosteal ossification with integrity of chondral deposits. The bones are fragile, and fracture easily. In true acondroplasia, on the other hand, the epiphyses are normal, but there is defective ossification on the shaft side of the long bones, resulting in short, stunted limbs. This condition differs from rickets, also, in that there exists a peculiar fecundity, as is shown by cases cited. Cæsarean section is the only operation worth considering in the rachitic or achondroplastic dwarfs. In ordinary rachitis, of course, where there has been no arrest of development and bone-softening, the induction of premature labor, symphyseotomy, or forceps may succeed, accordingly as the pelvic deformity is less marked. In the myxœdematous dwarfs, labor usually terminates spontaneously, the pelvis not often being markedly deformed. No difficulty whatever is met with, as a rule, in physiological dwarfs. — *Annales de Gyn. et d'Obstét.*, Jan., 1906.

CAREY CULBERTSON.

TUBERCULOSIS AND PREGNANCY. By Alf. Rosthorn.

This subject is taken up in a systematic manner and discussed under the following heads.

1. The frequency of tuberculosis in his clinic. Out of 1,500 cases of pregnancy, but 25 showed tuberculosis, or 1.06 per cent. In these were found pronounced lung changes. The majority of the women were single as regards social condition, and, for the most part, were servants, seamstresses, and factory girls. Their ages ranged from 24 to 44 years, and 18.7 per cent of those so affected were multiparæ. A few attempts were made, in cases where the processes were latent, circumscribed, or healed, to secure a diagnosis by the tuberculin reaction, but without success. This may have been due to too small dosage, or to the fact that the reaction in the pregnant woman is not the same as in the non-pregnant one.

2. Deterioration in condition during pregnancy. Progressive deterioration occurred in 16 cases, or 64 per cent; marked rapid decline, even in objective findings, took place in 9 cases, or 36 per cent; 4 died, or 16 per cent. Besides this, in 5 other cases, evidences of tuberculosis appeared objectively, 3 of which terminated fatally, or 66.5 per cent. The first death occurred at once after labor, the second a few weeks after, the third a year later, while a fourth woman, following a spontaneous premature delivery, ran an even course. The fifth case rapidly improved subjectively after labor, but is again pregnant and losing progressively. In the majority of these cases the process has existed a greater or less number of

years, since childhood or puberty, with exacerbation in pregnancy. Why this characteristic deterioration should occur, Rosthorn cannot explain, but it is more probably due to the decreased respiration resulting from pregnancy and labor itself, rather than to such other conditions as, for instance, the impaired nutrition following prolonged emesis.

3. Spontaneous interruption of pregnancy. In 23 cases this occurred but twice. In the 2 other cases, severe hemorrhage made miscarriage probable, but 1 responded to treatment, and in the other abortion was completed by operative interference. Counting this with the 2 spontaneous abortions gives a percentage of 13. Of the remaining, 13 women went to term and bore well-developed children.

4. Artificial interruption of pregnancy. This procedure was undertaken in 5 cases, usually in the third or fourth month. As a rule, there was no substantial change following the abortions. In 1 case, improvement was marked; in 2, a fatal termination came one or two days after.

5. Influence of complications on the course, and their value in prognosis. (*a*) Laryngeal tuberculosis was met with three times. In two cases the patients died soon after induced abortion, the third woman, with advanced phthisis, went through labor at term, with normal puerperium. (*b*) Seven cases (30 per cent) showed fever before labor, 4 of which are those who died. The remaining 3 grew progressively worse. (*c*) Five women (25 per cent) suffered from hæmoptysis before pregnancy, and during pregnancy two of these were similarly affected, or 8 per cent. Hence it would appear that pregnancy does not tend to increase or even cause pulmonary hemorrhage. (*d*) As would be suspected, the physical examination of the lungs in these cases showed that the bilateral, infiltrating processes, particularly where accompanied by softening, give the most unfavorable prognosis. (*e*) Positive proof of tuberculosis, by bacteriologic examination, occurred in 7 cases, or 28 per cent. These patients went through easy abortions, with deterioration in the puerperium, and 4 deaths. (*f*) Increasing and marked emesis in the early months, persisting hyperemesis and the general condition of nutrition. Hyperemesis occurred in 2 cases, marked emesis in the early months in 10, and 9 women showed impaired assimilation. (*g*) Heredity. This did not seem to prove to be so important a factor in Rosthorn's cases. Environment did, however, 3 of the women who died having lived with husbands who were seriously ill with tuberculosis. (*h*) The children. Twelve lived, and 1 full-term babe was born macerated. Three full-term children were frail and did not do well. This was due in part, no doubt, to the fact that most of the babes were artificially nursed.

As to prognosis: (*a*) Pregnancy appears to be relatively safe in those women who have passed a year with a stationary pulmonary condition or have been "relatively cured," with favorable lung findings, with or without tubercle bacilli, well nourished, and without fever or hæmoptysis for a year. (*b*) Pregnancy may also end well in those patients who present well-localized, but recent, foci in the apices, provided they are free from fever, are well nourished, and do not grow worse during pregnancy.

Pregnancy is in every way dangerous under these circumstances: (*a*) If a "florid" process exists, with rapid breaking down and a permanent hyperpyrexia; (*b*) if with little objective trouble a light fever persists and does not yield to proper treatment, as at a hospital or sanitarium; (*c*) if the disease is not limited to the apices and upper lobes, but involves, as well, the middle and lower lobes; (*d*) if the pulmonary condition is, in turn, complicated by disease of the circulatory, urogenital, or intestinal tracts, etc.; (*e*) if there is laryngeal tuberculosis, very important unless very slightly involved; (*f*) where marked hereditary conditions have obtained.

Artificial abortion may and should be considered as follows:

1. In all destructive processes, young or old, where there is temperature.

2. In slight involvement, where some other complication exists, particularly laryngeal tuberculosis, and most especially if the arytenoid cartilages are involved.

3. In those relatively cured cases where, in spite of properly conducted hygienic and dietetic treatment, undoubted and rapid emaciation takes place. — *Monatsschrift f. Geb. und Gyn.*, March, 1906. CAREY CULBERTSON.

# BOOK REVIEWS

EDINBURGH STEREOSCOPIC ATLAS OF ANATOMY. Section II. New York: Imperial Publishing Company.

The views in this section illustrate the position and relation, as well as the shape, and in some cases the structure, of the abdominal and some of the pelvic viscera. The anatomy of the female pelvis has been held over to another section, but the present series illustrates very completely the anatomy of the inguinal region, and will prove of especial interest in connection with the study of inguinal hernia. The intention has been, as a rule, to confine the views to typical cases, but views of some extreme variations from the normal are shown. The pictures are very clever photographic reproductions of the parts under consideration, and the stereoscope which accompanies the views gives excellent delineation at the proper focus. The series should be an excellent aid in the anatomical study of the parts included in the section. M. L. B.

DIE PLACENTATION BEIM MENSCHEN. By J. Clarence Webster, M. D., Chicago. Translated into German by Gustav Kolischer, M. D., Chicago. Published by Oscar Coblentz, Berlin.

The author, already well known in Germany by his thorough and painstaking work on tubal pregnancy, again addresses, in his present work, the German medical world. It represents the results of many years of profound study, made chiefly in the laboratory of the Royal College in Edinburgh, comprising the many publications of the author in English journals, and adding a number of new facts.

The book represents a noble testimony of the author's high scientific spirit and ideals, and we sincerely wish that it may find many readers. The thorough perusal of such a work will show to many obstetrical specialists that the time when the performance of Cæsarean section seemed to be in the highest demand has passed, and that modern obstetrical science demands more than that; for the last decade has produced a scientific obstetrician besides the accoucheur, who attacks one of the deepest problems of biology; i. e., production and growth of the human in utero.

One of the principal features of the book is its splendid illustrations. On 27 plates, 155 original pictures of the fœtal structures in connection with the uterus are given; all high-art reproductions of microphotograms. The interpretation of the pictures might differ in a few instances from that of the author, according to the personal view of decidua and fœtal cells. Notwithstanding, Webster's book furnishes to all younger authors interested in the histological details of pregnancy, an object for comparison not heretofore found in such perfection. It greatly facilitates orientation in this difficult question, the more so as its publication coincides with a new departure in that field of biology.

Seventy-nine pages of text accompany the illustrations, in which the anatomy of placentation is described in a precise and clear way, and at the same time critically reviewed. The ovum reported by Peters forms the foundation of Webster's description of the human placentation, while other young ova described by Leopold, Reichert, Merthens, and others are also fully considered. The great number of personal observations enables the author to scrutinize the histological findings of the various authors, and thus to draw in short lines a clear and original picture of the development and relations of the fœtal membranes from the earliest observations up to the puerperium.

It was not the author's intention to discuss every work touching upon this subject. His evident purpose is to clear up the anatomical part of placentation; all biological and pathological reports are therefore omitted. The literature of normal placentation is in itself excessively large. If, however, comparative anatomy and histopathological sequelæ were included, the subject would become boundless. The reviewer, however, was astonished that Siegenbeck Heukelbom's ovum, which, on account of its excessive trophoblastic proliferations, has roused the interest of all European gynecologists, is but shortly mentioned.

The structural relations of the various parts of the decidua, of the chorion and amnion, are discussed separately at the different months of gestation. Webster regards the decidua-cell as the embryonal cell of the uterine mucosa, enlarged by the process of pregnancy. Besides the hypertrophy, the author assumes a hyperplasia, and explains hereby the presence of decidua-cells containing several nuclei. While most of the German authors look at the decidua-cell as a degenerative product, Webster is rather inclined to attribute

regenerative faculties to these cells. The retrogressive changes of the decidua are fully discussed, a chapter that, so far, has not been given sufficient attention by other investigators. The disappearance of the decidua towards the end of pregnancy is explained by mechanical reasons. Nitabuch's fibrinous stripe is regarded by the author as a maternal product, contrary to Langhans, Bloch, and others. A new argument for the fœtal origin of the syncytium is added by the author's statement, that his examinations of the vera in the sixth week did not reveal any syncytium.

The difficult chapter of the relations between ovum and decidua is treated very intuitively, particularly the development of the intervillous spaces. Webster separates the maternal sinus from the intervillous spaces, which latter are the result of the vacuolization and reticulation of trophoblastic masses, and comes thus to the same conclusion Siegenbeck Heukelbom and Peters arrived at. Recent German writers have comprised these findings in the statement, that there is no maternal placenta, but only a fœtal.

In connection with placentation the ætiology of placenta prævia is discussed. According to Webster, deep insertion of the ovum forms the most frequent cause of placenta prævia, next is reflexo-placenta, and then the combination of both. There is one part, to which Webster refers, and which I would like to point out, as it is not sufficiently known, namely, that placenta prævia is quite frequently the cause of abortion. Webster is one of the first that try to explain why, in some cases of placenta prævia, hemorrhage does not occur before the end of pregnancy. While he states expressly that in all the three forms different causes independent from the position of the placenta might start hemorrhage, his personal experience leads him to believe that in most cases of placenta prævia in labor at term a deep insertion of ovum is present. This, however, is an open question. He justly emphasizes the great importance of the anatomical examination of the expelled placenta in order to solve this question.

German gynecologists have all reason to be thankful to the author for publishing his researches in German, and in this way furnishing them a standard anatomical atlas of human placentation, which will surely find a large circulation.

GEORGE SCHMAUCH, M. D.

GENERAL SURGERY. Practical Medicine Series. Edited by John B. Murphy, A. M., M. D., LL. D. Vol. ii. Chicago: The Year Book Publishers. 1906.

This excellent volume of nearly six hundred pages is just what it purports to be, a survey of the surgical advances during the past year. The author has abstracted a wide field of surgical literature, and, in addition, has reproduced some articles extensively where the subject-matter would seem to warrant it. The editorial discussion of the more important subjects is not the least valuable part of the book.

HEATH'S MANUAL OF MINOR SURGERY AND BANDAGING. Revised by Bilton Pollard, F. R. C. S. Philadelphia: P. Blakiston's Son and Company. Thirteenth edition. 1906.

PRACTICAL MEDICINE SERIES; EAR, EYE, NOSE, AND THROAT. Edited by Casey A. Wood, C. M., M. D., D. C. L.; Albert H. Andrews, M. D.; Gustavus P. Head. Series 1906. Chicago: Year Book Publishers.

# CORRESPONDENCE

## NICHOLAS SENN FESTSCHRIFT

EDITOR SURGERY, GYNECOLOGY AND OBSTETRICS.

The following distinguished members of the medical profession, on request, have signified their pleasure in contributing an article to Dr. Nicholas Senn's Festschrift.

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BYRON ROBINSON,
Chairman of Publication Committee.

EDITOR SURGERY, GYNECOLOGY AND OBSTETRICS.

*Dear Sir,* — I have read with much interest and cordial approval your article in the May issue of SURGERY, GYNECOLOGY AND OBSTETRICS, entitled "Co-operation among the German Universities." I can scarcely refrain, however, from directing your attention to the fact that although heretofore the Japanese have been committed to German medicine, recently an additional medical school (the thirteenth, I believe) has been established in Japan, and in this study of English is compulsory among the students. This information was derived from Baron Takaki during his recent visit in Philadelphia. The Baron, I understand, is the head of this new medical school. You know that the Baron's son is a student at the University of Pennsylvania. In the course of a speech in Philadelphia the Baron expressed his high appreciation of the English-speaking races, and stated that he hoped to further this appreciation among his people. But I believe that it is an interesting commentary upon the progress of events, that the use of English should be made compulsory in the latest established medical school in Japan. No one has greater regard for German medicine than I; indeed, much that I know I learned from the German-speaking physicians, but the extension of the English language as a medium of the learning of medicine cannot but be gratifying to those whose mother tongue this is.

PHILADELPHIA, May 29, 1906. A. O. J. KELLY.

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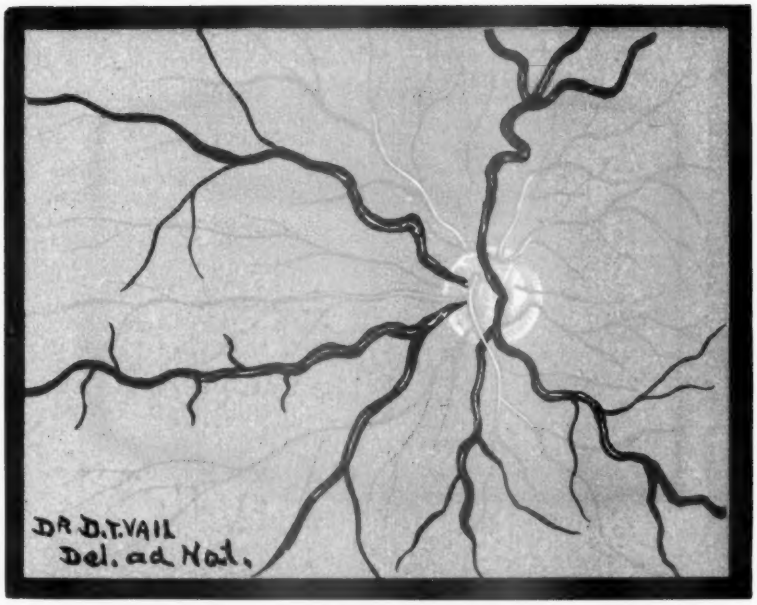
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